
Appendix G:
Biological Resources

Appendix G:

Biological Resources

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Appendix G

Biological Resources

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Special Status Species Lists

Appendix G-1

Special Status Species List

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Appendix G-1
Special Status Species List

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Appendix G-1 Special Status Species List

**Table G-1
Federal and State Listed Endangered or Threatened Species and Occurrence in the Project Area**

Name	Status*	Habitat	Potential for Occurrence in Study Area**				
			Gross Reservoir	Leyden Gulch Site	Conduits M and O	South Platte River Facilities	Denver Basin Aquifer Facilities
Birds							
Burrowing owl <i>Athene cunicularia</i>	ST, BLM, USFS	Nests in abandoned prairie dog burrows in summer.	1	4B	4B	4B	1
Interior least tern <i>Sterna antillarum athalassos</i>	FE, SE	Migrants occur at reservoirs, lakes, and rivers with bare, sandy shorelines.	1	1	2	3	2
Mexican spotted owl <i>Strix occidentalis lucida</i>	FT, ST	Mixed conifer forests and pinyon-juniper woodland with narrow, shady, sandstone canyons at 4,400-6,800 feet.	1	1	1	1	1
Mountain plover <i>Charadrius montanus</i>	FP, ST, BLM, USFS	Breeds in shortgrass prairie. Often associated with prairie dog colonies and heavy grazing.	1	1	1	1	1
Piping plover <i>Charadrius melodus</i>	FT, ST	Wetlands, lakeshores, and marshes. Rare migrant on eastern plains to foothills between April and May.	1	1	2	2	1
Whooping crane <i>Grus americana</i>	FE, SE	Rare migrant in wetlands, wet meadows, broad drainage bottoms, and reservoir edges; in areas with minimal human disturbance.	1	1	1	1	1
Mammals							
Canada lynx <i>Lynx canadensis</i>	FT, SE	Contiguous old-growth spruce, fir, and lodgepole pine forests with deep snow and snowshoe hare.	1	1	1	1	1
North American wolverine <i>Gulo gulo</i>	FP, SE, USFS	Rare inhabitant of alpine and subalpine habitats.	1	1	1	1	1
Preble’s meadow jumping mouse <i>Zapus hudsonius preblei</i>	FT, ST	Front Range up to 7,600 feet in well-developed plains riparian vegetation with adjacent, undisturbed upland grassland near water.	2	2	1	1	1
River otter <i>Lontra canadensis</i>	ST, USFS	Riparian habitats with permanent water.	1	1	1	1	1
Amphibians							
Boreal toad <i>Anaxyrus boreas boreas</i>	SE, BLM, USFS	Damp areas dominated by lodgepole pine, aspen, or Englemann spruce-subalpine fir forests.	1	1	1	1	1

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Special Status Species List

Table G-1 (continued)
Federal and State Listed Endangered or Threatened Species and Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Study Area**				
			Gross Reservoir	Leyden Gulch Site	Conduits M and O	South Platte River Facilities	Denver Basin Aquifer Facilities
Fishes							
Common shiner <i>Luxilus cornutus</i>	ST	Rare in Colorado; Records from early 1980s from mainstem South Platte in Denver but considered very rare.	1	1	1	1	1
Greenback cutthroat trout <i>Oncorhynchus clarki stomias</i>	FT, ST	Prefers cold, clear, gravely headwater streams in the Arkansas and South Platte river drainages.	2	1	1	1	1
Lake chub <i>Couesius plumbeus</i>	SE	Lake habitats; spawn in streams. Occur in St. Vrain River and two reservoirs in Clear Creek County.	1	1	1	1	1
Northern redbelly dace <i>Chrosomus eos</i>	SE	Remaining populations in West Plum Creek; in submerged vegetation in slow-moving streams.	1	1	1	1	1
Invertebrates							
Pawnee montane skipper <i>Hesperia leonardus montana</i>	FT	Occurs in the South Platte Canyon, southwest of Denver.	1	1	1	1	1
Plants							
Ute ladies'-tresses orchid <i>Spiranthes diluvialis</i>	FT	Sub-irrigated alluvial soils along streams; open meadows on floodplains.	1	2	2	2	1
Colorado butterfly plant <i>Gaura neomexicana</i> ssp. <i>coloradensis</i>	FT	Sub-irrigated alluvial soils of drainage bottoms within mixed grass prairie.	1	2	2, 4	2	1

Notes:

Species list (Federal) obtained from USFWS, 2012. State species from CDOW, 2011c.

* Status: FT = Federally Threatened, FE = Federally Endangered, FP = Proposed for Listing, FC = Candidate for Federal Listing, ST = State of Colorado Threatened, SE = State of Colorado Endangered, USFS = U.S. Forest Service Region 2 sensitive, BLM = Bureau of Land Management sensitive

**Codes to Occurrence in Study Area:

- 1 = Not present – Habitat is unsuitable or outside current known range.
- 2 = Unlikely – Based on marginal habitat, rarity of occurrence and/or range. Also includes areas where habitat is suitable, but not found during presence/absence surveys or considered unlikely to occur by detailed habitat evaluation.
- 3 = Potentially present – Habitat suitable or marginal. Wide-ranging species may occur occasionally during foraging or migration but Project area do not have important habitat. No documentation of presence for sedentary species.
- 4 = Known or likely to occur; 4A – Habitat suitable, (animals) may occur regularly during foraging or migration; 4B – (animals) may breed in Project area.
- 5 = Known or likely to occur, key habitat features present.

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Special Status Species List

Table G-2
Federal and State Listed Endangered or Threatened Species and Occurrence in the River Segment Study Areas

Name	Status*	Habitat	Potential for Occurrence in Study Area**									
			River Segments ^a								Downstream Colorado	Downstream S. Platte
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (above Gross Res.)	S. Boulder Creek (below Gross Res.)	N. Fork S. Platte	S. Platte		
Birds												
Eskimo curlew <i>Numenius borealis</i>	FE	Migrates through Nebraska in wet meadow habitat along South Platte River.	1	1	1	1	1	1	1	1	1	2
Interior least tern <i>Sterna antillarum athalassos</i>	FE, SE	Migrants occur at reservoirs, lakes, and rivers with bare sandy shorelines.	1	1	1	1	1	1	1	3	1	5
Piping plover <i>Charadrius melodus</i>	FT, ST	Wetlands, lakeshores, and marshes. Rare migrant on eastern plains to foothills of Colorado between April and May.	1	1	1	1	1	1	1	2	1	5
Whooping crane <i>Grus americana</i>	FE, SE	Rare migrant in wetlands, wet meadows, broad drainage bottoms, and reservoir edges.	1	1	1	1	1	1	1	1	1	5
Yellow-billed cuckoo <i>Coccyzus americanus</i> (western Distinct Population Segment)	FP, SC, BLM, USFS	Riparian forest.	1	1	1	1	1	1	1	1	N/A	N/A

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Special Status Species List

Table G-2 (continued)
Federal and State Listed Endangered or Threatened Species and Occurrence in the River Segment Study Areas

Name	Status*	Habitat	Potential for Occurrence in Study Area**									
			River Segments ^a								Downstream Colorado	Downstream S. Platte
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (above Gross Res.)	S. Boulder Creek (below Gross Res.)	N. Fork S. Platte	S. Platte		
Mammals												
Canada lynx <i>Lynx canadensis</i>	FT, ST	Contiguous old-growth spruce, fir, and lodgepole pine forests with deep snow and snowshoe hare.	4	4	1	3	3	1	1	1	1	1
Preble’s meadow jumping mouse <i>Zapus hudsonius preblei</i>	FT, ST	In Front Range up to 7,600 feet in well-developed plains riparian vegetation with adjacent, undisturbed, upland grassland near water.	1	1	1	1	1	5	5	5	1	1
River otter <i>Lontra canadensis</i>	ST, USFS	Riparian habitats with permanent water.	4	4	5	4	1	1	1	1	N/A	N/A
Amphibians												
Boreal toad <i>Anaxyrus boreas boreas</i>	SE, BLM, USFS	Inhabit damp areas dominated by lodgepole pine, aspen, or Englemann spruce-subalpine fir forests.	4	4	1	2	2	1	1	1	N/A	N/A
Fishes												
Bonytail chub <i>Gila elegans</i>	FE, SE	Historically occurred in Colorado River drainage; currently only near Grand Junction.	1	1	1	1	1	1	1	1	5	1
Colorado pikeminnow <i>Ptychocheilus lucius</i>	FE, ST	Historically occurred in Colorado River; currently found on west slope only.	1	1	1	1	1	1	1	1	5	1

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Special Status Species List

Table G-2 (continued)
Federal and State Listed Endangered or Threatened Species and Occurrence in the River Segment Study Areas

Name	Status*	Habitat	Potential for Occurrence in Study Area**									
			River Segments ^a								Downstream Colorado	Downstream S. Platte
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (above Gross Res.)	S. Boulder Creek (below Gross Res.)	N. Fork S. Platte	S. Platte		
Common shiner <i>Luxilus cornutus</i>	ST	Rare in Colorado; records from early 1980s from mainstem South Platte River in Denver, but considered very rare.	1	1	1	1	1	1	1	2	N/A	N/A
Greenback cutthroat trout <i>Oncorhynchus clarki stomias</i>	FT, ST	Prefers cold, clear, gravely headwater streams in the Arkansas and South Platte River drainages.	5 ^b	5 ^b	1	1	1	1	1	1	1	1
Humpback chub <i>Gila cypha</i>	FE, ST	Historically occurred in Colorado River; found on west slope only.	1	1	1	1	1	1	1	1	5	1
Lake chub <i>Couesius plumbeus</i>	SE, USFS	Lake habitats; spawns in streams. Currently known from St. Vrain River and two reservoirs in Clear Creek County.	1	1	1	1	1	1	1	1	N/A	N/A
Northern redbelly dace <i>Chrosomus eos</i>	SE	Remaining populations in West Plum Creek (NDIS 2011); submerged vegetation in slow-moving streams.	1	1	1	1	1	1	1	1	N/A	N/A
Pallid sturgeon <i>Scaphirhynchus albus</i>	FE	Known population in Mississippi River. Not present in Colorado.	1	1	1	1	1	1	1	1	1	5
Razorback sucker <i>Xyrauchen texanus</i>	FE, SE	Historically occurred in Colorado River; currently found on west slope only.	1	1	1	1	1	1	1	1	5	1

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Special Status Species List

Table G-2 (continued)
Federal and State Listed Endangered or Threatened Species and Occurrence in the River Segment Study Areas

Name	Status*	Habitat	Potential for Occurrence in Study Area**									
			River Segments ^a								Downstream Colorado	Downstream S. Platte
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (above Gross Res.)	S. Boulder Creek (below Gross Res.)	N. Fork S. Platte	S. Platte		
Plants												
Ute ladies’-tresses orchid <i>Spiranthes diluvialis</i>	FT	Sub-irrigated alluvial soils along streams; open meadows on floodplains.	1	1	1	1	1	5	1	2	1	1
Colorado butterfly plant <i>Gaura neomexicana</i> ssp. <i>coloradensis</i>	FT	Sub-irrigated alluvial soils of drainage bottoms within mixed grass prairie.	1	1	1	1	1	1	1	2	1	1
Western prairie fringed orchid <i>Platanthera praeclara</i>	FT	Marshes and wet meadow communities in tallgrass prairie. Known population adjacent to Platte River in Nebraska.	1	1	1	1	1	1	1	1	1	5

Notes:

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- 4 = Known or likely to occur; 4A – Habitat suitable, (animals) may occur regularly during foraging or migration; 4B – (animals) may breed in Project area.
- 5 = Known or likely to occur, key habitat features present.

N/A = not applicable, only Federally listed species subject to requirements for ESA Section 7 consultation on depletion.

^a The sensitive portions of these river segments are where the endangered species and critical habitat are located; please see the discussion in Section 3.10 of the Final Environmental Impact Statement for a detailed description.

^b The identity of cutthroat trout in the Fraser Valley and Williams Fork tributaries is uncertain and the subject of current research by the USFWS. Trout previously considered to be Colorado River cutthroat trout may be greenback cutthroat trout (a listed threatened species).

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Special Status Species List

Table G-3
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Birds					
American bittern <i>Botaurus lentiginosus</i>	USFS	Summer resident of eastern plains and mountain parks. Inhabits wetlands with tall emergent vegetation.	1	N/A	N/A
American peregrine falcon <i>Falco peregrinus anatum</i>	SC, BLM, USFS, G4T4/S2B	Nests on cliffs, forages over many habitats.	3	4	4
American three-toed woodpecker <i>Picoides dorsalis</i>	USFS	Subalpine and montane forests, usually in areas of dead or dying conifers.	3	1	1
American white pelican <i>Pelecanus erythrorhynchos</i>	BLM, G3/S1B	Summers on large reservoirs. No breeding in Project area.	2	1	1
Bald eagle <i>Haliaeetus leucocephalus</i>	Bald and Golden Eagle Protection Act, SC, BLM, USFS, G5/S1B,S3N	Large bodies of open water near tall trees and prairie dog colonies, especially in winter.	3	3	4A
Barrow’s goldeneye <i>Bucephala islandica</i>	G5/S2B	Winter on reservoirs and rivers; summer in mountain reservoirs and ponds in forested areas.	2	1	3
Black tern <i>Chlidonias niger</i>	USFS	Associated with aquatic habitats containing emergent vegetation on the plains and in mountain parks.	1	N/A	N/A
Black swift <i>Cypseloides niger</i>	BLM, USFS, G4/S3B	Nests on cliffs or behind high waterfalls. Forage at high elevations.	3	1	1
Boreal owl <i>Aegolius funereus</i>	USFS, G5/S2	Mature mixed spruce-fir forest interspersed with meadows at elevations above 9,000 feet.	1	1	1
Brewer’s sparrow <i>Spizella breweri</i>	USFS	Usually in sagebrush or other shrubs vegetation; on migration may occur in woody, brushy or weedy areas.	1	N/A	N/A
Ferruginous hawk <i>Buteo regalis</i>	SC, BLM, USFS, G4/S3B,S4N	Grasslands with scattered trees; concentrate in prairie dog towns in winter.	1	4A	4A

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Flammulated owl <i>Psiloscops (Otus) flammeolus</i>	USFS	Nest in tree cavities in old-growth ponderosa pine/Douglas fir; in Boulder County, roost in mixed conifer and dense shrubs along small streams in summer.	4	N/A	N/A
Lewis' woodpecker <i>Melanerpes lewis</i>	USFS, G4/S4	Riparian cottonwood forest, open ponderosa pine forest.	2	N/A	N/A
Loggerhead shrike <i>Lanius ludovicianus</i>	USFS	Grassland with scattered trees, rural areas with abandoned farmyards.	1	3	3
Long-billed curlew <i>Numenius americanus</i>	SC, BLM, USFS, G5/S2B	May occur in migration in shortgrass prairie.	1	1	1
Northern goshawk <i>Accipiter gentilis</i>	BLM, USFS, G5/S3B	Nests in mature ponderosa pine, mixed-conifer, and spruce-fir forests with canopy closure greater than 60%.	4	1	1
Northern harrier <i>Circus cyaneus</i>	USFS	Grassland, agricultural areas, and marshes.	1	N/A	N/A
Olive-sided flycatcher <i>Contopus borealis</i>	USFS	Nests in mature spruce-fir and Douglas fir forests; dependent on riparian habitat.	3	N/A	N/A
Ovenbird <i>Seiurus aurocapillus</i>	G5/S2B	Rare migrant in lowland riparian forest, shrublands, and wooded urban areas.	2	2	2
Purple martin <i>Progne subis</i>	USFS	In Colorado, nests mainly in old growth aspen on western slope, occurs over riparian areas, open agricultural areas and reservoirs during migration.	2	N/A	N/A
Snowy egret <i>Egretta thula</i>	G5/S2B	Reservoirs, grassy marshes, wet meadows, and rivers. May occur during migration in Project sites.	1	1	4
White-faced ibis <i>Plegadis chihi</i>	BLM, G5/S2B	May occur in migration in wet meadows, marsh edges, and reservoir shorelines.	1	1	1
White-tailed ptarmigan <i>Lagopus leucurus</i>	USFS, G5/S4	Alpine tundra; may winter below tree line in areas with willows or alders near alpine habitats.	1	1	1

Appendix G-1 Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Mammals					
American marten <i>Martes americana</i>	USFS	Old-growth lodgepole pine and spruce-fir forests.	1	N/A	N/A
Black-tailed prairie dog <i>Cynomys ludovicianus</i>	SC, BLM, USFS, G4/S3	Short and mixed grass prairie along Front Range.	1	5	2, 5
Dwarf shrew <i>Sorex nanus</i>	G4/S2	Foothills, montane and subalpine habitats above 5,500 feet.	3	1	1
Fringed myotis <i>Myotis thysanodes</i>	BLM, USFS, G4G5/S3	Ponderosa pine woodlands and oakbrush.	3	N/A	N/A
Pygmy shrew <i>Sorex hoyi</i>	USFS, G5T2T3/S2	Subalpine, prefer areas interspersed with wetlands and dry upland forests.	1	1	1
Rocky Mountain bighorn sheep <i>Ovis canadensis canadensis</i>	USFS	Open areas with grass and low shrub, near escape terrain and topographic relief.	1	N/A	N/A
Swift fox <i>Vulpes velox</i>	SC, BLM, USFS, G3/S3	Shortgrass prairie.	1	1	1, 3
Townsend's big-eared bat (pale subspecies) <i>Corynorhinus townsendii pallescens</i>	SC, BLM, USFS, G4T4/S2	Roosts in caves and abandoned mines in shrublands and open montane forests up to 9,500 feet.		1	1
Amphibians					
Northern leopard frog <i>Lithobates pipiens</i>	SC, BLM, USFS, G5/S3	Usually under 9,500 feet near permanent water, including margins of ponds, lakes, streams, and in marshes.	2	4	2

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Reptiles					
Common garter snake <i>Thamnophis sirtalis</i>	SC	Marshes, ponds, and stream edges.	1	1	1, 4
Invertebrates					
Rocky Mountain capshell (mollusk) <i>Acroloxus coloradensis</i>	SC, USFS, G3/S1	Known in Colorado from a small number of mountain lakes between 8,000 and 9,800 feet.	1	1	1
Cylindrical papershell (mollusk) <i>Anodontoides ferussacianus</i>	SC, G5/S2	Mud or sandy substrates of lakes and quiet streams, hosts for larvae are warmwater fish.	1	1	1
Swampy lymnaea (mollusk) <i>Lymnaea stagnalis</i>	G5/S2	Warm, shallow ponds, lakes and marshes in mountainous areas.	3	1	2
Glass physa (mollusk) <i>Physa skinneri</i>	G5/S2	Shallow bodies of water, either perennial or seasonal, such as temporary ponds, and backwaters along streams.	1	1	2
Banded physa (mollusk) <i>Physa utahensis</i>	G5T22/S1	No specific distribution available. In water.	3	1	1
Umbilicate sprite (mollusk) <i>Promenetus umbilicatellus</i>	G4/S3	Occurs in lakes/reservoirs.	3	1	1
Sandhill fritillary (butterfly) <i>Boloria selene sabulocollis</i>	G5T2/S1S2	Wet meadows, bogs, and marshes. Feed on nectar of <i>Solidago</i> sp. and black-eyed susan.	2	1	2, 1
Moss's elfin (butterfly) <i>Callophrys mossii schryveri</i>	G4T3/S2S3	Rocky outcrops, woody canyons, cliffs at elevations from 5,600 to 8,000 feet. Larval host plant is Sedum.	2	3	1
Mottled dusky wing (butterfly) <i>Erynnis martialis</i>	G3/S2S3	Open woodland, prairie hills, open brushy fields. Larval host plant is <i>Ceanothus</i> .	2	1	1
Painted damsel (damselfly) <i>Hesperagrion heterodoxum</i>	G5/S1	No specific habitat information available. Near water.	2	1	2
Arogos skipper (butterfly) <i>Atrytone arogos</i>	G3/S2	Relatively undisturbed mixed and tallgrass prairies; larval host plants are big bluestem, little bluestem, and switchgrass. Primarily in foothill canyons and low ridges, not prairie.	2	2	3

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Ottoe skipper (butterfly) <i>Hesperia ottoe</i>	USFS, G3G4/S2	Unplowed, native mid and tall-grass prairie. Caterpillar food plant is little and big bluestems, or side-oats grama. Adults nectar at native thistles and other flowers.	1	2	2
Cross-line skipper (butterfly) <i>Polites origenes</i>	G4G5/S3	Open grassy areas, prairies hills, powerline cuts, and forest openings. Larvae feed on little bluestem and other grasses.	2	3	2
Hops feeding azure (butterfly) <i>Celastrina humulus</i>	G2G3/S2	Feeds on host plant, wild hops, in upland shrubland areas.	1	2	2
Hudsonian emerald (dragonfly) <i>Somatochlora hudsonica</i>	USFS, G5/S2S3	Spring-fed mountain wetlands, ponds and lakes with boggy edges and sedge meadows.	1	1	1
Rhesus skipper (butterfly) <i>Polites rhesus</i>	G4/S2S3	Short and mixed-grass prairie. Caterpillar host plant is blue grama; adults nectar on <i>Astragalus</i> sp. and yellow composites.	1	3	2
Regal fritillary (butterfly) <i>Speyeria idalia</i>	USFS, G3/S1	Tall-grass prairie and other open sites including damp meadows, marshes, and wet fields. Caterpillar host plant is violet. Adults nectar on milkweeds and thistles.	1	2	2
Plants					
Larimer aletes <i>Aletes humilis</i>	ARNF, G2G3/S2S3	Cracks and crevices of granite outcrops and on decomposed granite soils.	2	1	1
Dwarf wild indigo <i>Amorpha nana</i>	G5/S2S3	Prairies and grasslands.	1	3	1
Wild sarsaparilla <i>Aralia nudicaluis</i>	ARNF	Cool ravines, foothills and montane. Moist to dry wooded areas.	5	N/A	N/A
Forktip three-awn <i>Aristida basiramea</i>	G5/S1	Dry, open, sandy soils in grassland and sandstone outcrops.	1	1	1
Sea pink (Siberian sea thrift) <i>Armeria maritima</i> ssp. <i>sibirica</i> (<i>Armeria scabra</i> spp. <i>sibirica</i>)	USFS, G5T5/S1	Alpine; tundra, grassy slopes; 11,900-13,000 feet. Nearest location is Hoosier Ridge in Park County.	1	1	1

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Dwarf milkweed <i>Asclepias uncialis</i> ssp. <i>uncialis</i>	BLM, USFS, G3G4T2T3/S2	Shortgrass prairie, on sandstone-derived soils and gravelly or rocky slopes. Elevation 4,000 to 6,500 feet.	1	1	1
Park milkvetch <i>Astragalus leptaleus</i>	USFS, G4/S2	Montane sedge meadows, grassy stream banks, 7,500 to 10,000 feet.	2	1	1
Paper birch <i>Betula papyrifera</i>	ARNF, G5/S1	Cool, north-facing ravines in foothills.	2	1	1
Upswept moonwort <i>Botrychium ascendens</i>	USFS	Mesic montane coniferous forest.	2	1	1
Prairie moonwort <i>Botrychium campestre</i>	USFS, G3G4/S1	Well-drained dry to mesic soils in sunny, non-forested habitats at low elevation.	1	1	1
Reflected moonwort <i>Botrychium echo</i>	G3/S3	Gravelly soils near roads and trails, rocky hillsides, grassy slopes, and meadows at 8,200 to 12,140 feet.	1	1	1
Forktip moonwort <i>Botrychium furcatum</i>	USFS, G1G2/S1S2	Subalpine.	1	1	1
Triangle-leaved moonwort, green-stemmed phase <i>Botrychium lanceolatum</i> ssp. <i>viride</i>	ARNF	Mesic deciduous woodlands under closed canopy and mesic coniferous forests.	2	N/A	N/A
Slender moonwort <i>Botrychium lineare</i>	USFS, G2/S1	Grassy slopes, in tall grasses, stream edges in forests at 7,900 to 9,500 feet. Only 3 populations in Colorado (Elevation Paso and Lake counties).	2	1	1
Leather leaf grapefern <i>Botrychium multifidum</i>	ARNF, G5/S1	Wet meadows, forest edges, lake shores or margins. Typically at elevations between 6,750 to 11,500 feet.	2	1	1
Paradox moonwort <i>Botrychium paradoxum</i>	USFS	Montane to subalpine grasslands or forb-dominated meadows.	1	1	1
Northwestern moonwort <i>Botrychium pinnatum</i>	ARNF, G4/S1	Moist grassy sites in open forests, meadows, near streams, and other sites where soil moisture is constant.	2	1	1
“Redbank” moonwort <i>Botrychium “redbank”</i>	ARNF	Subalpine open upland areas in Colorado.	1	N/A	N/A

Appendix G-1
Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Least moonwort <i>Botrychium simplex</i>	ARNF, G5/S2	Subacid or acid soils high in organic matter, 8,500 to 12,700 feet.	1	1	1
Rattlesnake fern <i>Botrychium virginianum</i> (<i>Botrypus virginianus</i>)	ARNF, G5/S1	Cool, moist ravines and canyons in the foothills.	2	1	1
Dewey sedge <i>Carex deweyana</i>	ARNF	Moist foothill and montane ravines.	5	N/A	N/A
Lesser panicled sedge <i>Carex diandra</i>	USFS, G5/S1	Montane and subalpine fens; over 6,000 feet.	1	1	1
Woollyfruit sedge <i>Carex lasiocarpa</i>	ARNF, G5/S1	Subalpine fens.	1	1	1
Mud sedge <i>Carex limosa</i>	ARNF, G5/S2	Fens; montane or subalpine peatlands; often as part of a floating mat community adjacent to an open water system.	1	1	1
Livid sedge <i>Carex livida</i>	USFS, G5/S1	Montane and subalpine fens over 6,400 feet.	1	1	1
Peck's sedge <i>Carex peckii</i>	ARNF, G4G5/S1	Cool shaded gulches, Front Range foothills.	2	1	1
Sprengel's sedge <i>Carex sprengelii</i>	ARNF, G5/S2S3	Moist soil in cool ravines in the foothills.	5	1	1
Torrey sedge <i>Carex torreyi</i>	G4/S1	Gulches in outer foothills near Boulder.	2	2	2
Sandhill goosefoot <i>Chenopodium cycloides</i>	USFS, G3G4/S1	Sandy soils, often around the edges of blowouts in sand dunes, 3,800-5,700 feet elevation in Colorado.	1	1	1
Enchantress's nightshade <i>Circaea alpina</i>	ARNF	Moist to wet woods and cool ravines.	5	N/A	N/A
Purple cinquefoil <i>Comarum palustre</i>	ARNF	Grows in bogs, marshes, wet meadows, creek banks, and lake margins.	2	N/A	N/A
Yellow coralroot <i>Corallorhiza trifida</i>	ARNF	Montane and subalpine forests; cool, moist habitats.	2	N/A	N/A

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Spring coralroot <i>Corallorhiza wisteriana</i>	ARNF	Semi-shade in montane aspen and pine.	2	N/A	N/A
Bunchberry <i>Cornus canadensis</i>	ARNF	Subalpine forests.	1	N/A	N/A
Hazelnut <i>Corylus cornuta</i>	ARNF	Cool ravines in the foothills.	2	N/A	N/A
Yellow hawthorn <i>Crataegus chrysocarpa</i>	G5/S1	Thickets and rocky ground along streams.	1	2	1
Yellow lady's slipper <i>Cypripedium parviflorum</i>	USFS, G5/S2	Montane and subalpine, moist forest and aspen groves, 7,400 to 8,500 feet.	3	1	1
Clawless draba <i>Draba exunguiculata</i>	USFS, G2/S2	Alpine; talus slopes, fell fields; 11,500-14,000 feet.	1	1	1
Gray's peak whitlow-grass <i>Draba grayana</i>	USFS, G2/S2	Alpine, subalpine; tundra, gravelly slopes; 11,000-14,000 feet.	1	1	1
Roundleaf sundew <i>Drosera rotundifolia</i>	USFS, G5/S2	Subalpine; peatmats, fens; 9,100-9,800 feet.	1	1	1
Stream orchid <i>Epipactis gigantea</i>	USFS, G4/S1S2	Mineral-rich environments with a constant supply of moisture, and it occurs at springs, seeps, and along creeks.	2	1	1
Dropleaf buckwheat <i>Eriogonum exilifolium</i>	USFS, G3/S2	Flat to moderately sloping barren areas in shrub-steppe and open woodland, 6,090 to 8,800 feet.	1	1	1
Slender cottongrass <i>Eriophorum gracile</i>	USFS, G5/S1S2	Montane, subalpine; fens, wet meadows; 8,100-12,000 feet.	1	1	1
Hall's fescue <i>Festuca hallii</i>	USFS, G4/S1	Alpine, subalpine; tundra, dry grasslands; 11,000-12,000 feet.	1	1	1
Rattlesnake-plantain <i>Goodyera repens</i>	ARNF, G5/S3S4	Shade-loving species found in cool, coniferous forests, usually with a mossy understory. Elevation 8,000 to 9,500 feet.	2	1	1
Scarlet gilia <i>Ipomopsis aggregata ssp. weberi</i>	USFS, G5T2/S2	Open sites in sagebrush, snowberry, shrubby serviceberry, chokecherry.	1	1	1

Appendix G-1
Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Simple kobresia <i>Kobresia simpliciuscula</i>	USFS, G5/S2	Alpine; glacial outwash, fens, moist gravelly tundra; 9,600-12,800 feet.	1	1	1
Tall blue lettuce <i>Lactuca biennis</i>	ARNF	Clearings in the foothill canyons.	5	N/A	N/A
Gayfeather, Rocky Mountain blazing star <i>Liatris ligulistylis</i>	ARNF, G5/S2	Wet meadows and moist swales, lower elevations.	1	2	2
Wood lily <i>Lilium philadelphicum</i>	ARNF, G5/S3S4	Moist woods, thickets, and wet meadows.	2	1	1
Northern twayblade <i>Listera borealis</i>	ARNF, G4/S2	Moist shady spruce forests, elevations of 8,700 to 10,800 feet.	1	1	1
Broad-leaved twayblade <i>Listera convallarioides</i>	ARNF, G5/S2	Moist, shady spruce forests, 8,700 to 10,800 feet.	1	1	1
Heartleaved twayblade <i>Listera cordata</i>	ARNF	Found in peat-moss hummocks in forests or boggy areas. Also in upland forest humus and or needle duff.	2	N/A	N/A
Utah lupine <i>Lupinus lepidus</i> ssp. <i>utahensis</i>	ARNF	Gravelly to sandy soils, sagebrush.	1	N/A	N/A
Stiff club-moss <i>Lycopodium annotinum</i>	ARNF	Subalpine spruce thickets and willows.	1	N/A	N/A
Fringed loosestrife <i>Lysimachia ciliata</i>	ARNF	Wetlands in the Front Range, 5,100-8,000 feet elevation.	1	N/A	N/A
Colorado tansy-aster <i>Machaeranthera coloradoensis</i>	USFS, G3/S3	Alpine, subalpine; park grasslands, scree slopes, dry tundra; 7,600-13,000 feet.	1	1	1
White adder's-mouth orchid <i>Malaxis brachypoda</i> (<i>Malaxis monophyllos</i> ssp. <i>brachypoda</i>)	USFS, G4?/S1	Shaded streamsides, mossy wet areas. In Colorado, known from foothills near Boulder in Boulder and Jefferson counties.	2	1	1
Leechleaf blazingstar <i>Mentzelia sinuata</i>	ARNF	Shale outcrops, Front Range foothills.	1	N/A	N/A
Buckbean <i>Menyanthes trifoliata</i>	ARNF	Upper montane and subalpine ponds.	1	N/A	N/A

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Budding monkeyflower <i>Mimulus gemmiparus</i>	USFS, G1/S1	Subalpine and montane; seepages and wet banks; 8,400-11,120 feet.	2	1	1
Kotzebue's grass of Parnassus <i>Parnassia kotzebuei</i>	USFS, G5/S2	Alpine, subalpine; wet rocky areas, moss mats; 10,000-12,500 feet.	1	1	1
Harrington's penstemon <i>Penstemon harringtonii</i>	BLM, USFS, G3/S3	Open sagebrush shrublands on gentle slopes, 6,400 to 9,400 feet.	1	1	1
Sweet coltsfoot <i>Petasites sagittatus</i>	ARNF	Marshy meadows in intermountain parks and meadows.	1	N/A	N/A
Bell's twinpod <i>Physaria bellii</i>	G2G3/S2S3	Shale outcrops from Fort Collins and Denver in shrub communities dominated by <i>Rhus trilobata</i> and <i>Cercocarpus montanus</i> .	1	2	2
Rock cinquefoil <i>Potentilla rupicola</i>	USFS, G2/S2	Granite and schist outcrops and cliffs on coarse shallow soils, exposed sites, montane and subalpine zone.	3	1	1
Greenland primrose <i>Primula egaliksensis</i>	USFS, G4/S2	Extreme rich fens 9,000-10,000 feet in Colorado.	1	1	1
Slivery primrose <i>Primula incana</i>	ARNF	Alkaline clay soil in floodplains and moist open meadows.	1	N/A	N/A
Pictureleaf wintergreen <i>Pyrola picta</i>	ARNF, G4G5/S3S4	Cool, moist woods on north or northeast-facing slopes, 6,000-10,000 feet.	2	1	1
Ice cold buttercup <i>Ranunculus karelinii</i> (<i>R. gelidus</i> ssp. <i>Grayi</i>)	USFS, G4G5/S1	Alpine; scree slopes, dry rocky areas; 12,000-14,100 feet.	1	1	1
American currant <i>Ribes americanum</i>	G5/S2	Riparian areas, lower elevations.	1	2	2
Dwarf raspberry <i>Rubus arcticus</i> ssp. <i>acaulis</i> (<i>Cylactis arcticus</i> ssp. <i>acaulis</i>)	USFS, G5T5/S1	Montane and subalpine willows and wet meadows (fens), swampy conifer forest.	4	1	1
Silver willow <i>Salix candida</i>	USFS, G5/S2	Foothills, montane; rich fens, pond edges, permanently saturated peatlands; 8,800-10,600 feet.	1	1	1

Appendix G-1
Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Autumn willow <i>Salix serissima</i>	USFS, G4/S1	Peatlands with saturated soils (fens, willow carrs), streambanks.	1	1	1
Maryland sanicle <i>Sanicula marilandica</i>	ARNF	Along streams in cool canyons in foothills.	5	N/A	N/A
False melic <i>Schizachne purpurascens</i>	ARNF	Deeply shaded forested slopes.	5	N/A	N/A
Rocky Mountain bulrush <i>Schoenoplectus saximontanus</i>	G5/S1	Damp soils, ponds, ditches, vernal moist areas, drying mudflats.	1	2	2
Peatmoss <i>Sphagnum angustifolium</i>	USFS, G5/S2	Subalpine iron fens and fens, nine locations in Colorado.	1	1	1
Baltic sphagnum <i>Sphagnum balticum</i>	USFS, G2G4/S1	Subalpine iron fens, two locations in Colorado.	1	1	1
Sphagnum, all species not listed as USFS sensitive	ARNF	Fens, seeps.	1	N/A	N/A
Lesser bladderwort <i>Utricularia minor</i>	USFS, G5/S2	Montane fens and seeps, freshwater marshes.	1	1	1
Prairie violet <i>Viola pedatifida</i>	G5/S2	Prairies, open woodlands, and forest openings.	1	2	2
Selkirk's violet <i>Viola selkirkii</i>	USFS, G5/S1	Cold, north-facing drainages in montane forests.	2	1	1

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Special Status Species List

Table G-3 (continued)
Other Special Status Species Occurrence in the Project Area

Name	Status*	Habitat	Potential for Occurrence in Project Area**		
	State, BLM, USFS, CNHP		Gross Reservoir	Leyden Gulch Site	Conduits M and O
Ferns, all species except brittle bladderfern (<i>Cystopteris fragilis</i>)	ARNF	Various	5	N/A	N/A

Notes:

Species lists and status from CDOW, 2010; USFS, 2010; USFS, 2011; BLM, 2009; CNHP, 2010.

*Status:

- State: ARNF = Species of local concern, Arapaho & Roosevelt National Forests.
- BLM = Listed as sensitive by Bureau of Land Management.
- SC = Colorado Parks and Wildlife special concern.
- USFS = U.S. Forest Service Region 2 – Threatened, Endangered and Sensitive Plants and Animals. Sensitive species are those for which population viability is a concern as evidenced by: a) significant current or predicted downward trends in population numbers or density; or b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. USFS Management Indicator Species (MIS) are discussed in Sections 3.9, 4.6.9, and 5.9 except where they are also special status species (e.g., boreal toad).

CNHP Rank Definition:

- G1 = Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
- G2 = Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
- G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
- G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- G5 = Secure—Common; widespread and abundant.
- S1 = Critically Imperiled—Critically imperiled in the nation or State/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the State/province.
- S2 = Imperiled—Imperiled in the nation or State/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or State/province.
- S3 = Vulnerable—Vulnerable in the nation or State/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- S4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- S5 = Secure—Common, widespread, and abundant in the nation or State/province.
- T = Status of intraspecific taxa (subspecies or varieties) are indicated by a “T-rank” following the species' global rank.
- ? = Uncertainty about the rank, could be higher or lower.

**Codes to Occurrence in Project Area:

- 1 = Not present – habitat is unsuitable or outside current known range.
- 2 = Unlikely – based on marginal habitat, rarity of occurrence and/or range. Also includes areas habitat is suitable, but not found during presence/absence surveys or considered unlikely to occur by detailed habitat evaluation.
- 3 = Potentially present – Habitat suitable or marginal. Wide-ranging species may occur occasionally during foraging or migration but Project area does not have important habitat. No documentation of presence for sedentary species.
- 4 = Known or likely to occur; 4A – Habitat suitable. (Animals) may occur regularly during foraging or migration; 4B – (animals) may breed in Project area.
- 5 = Known or likely to occur, key habitat features present.
- N/A = Special status (USFS sensitive) is not applicable because no USFS lands in study area.

Appendix G-1
Special Status Species List

Table G-4
Other Special Status Species and their Occurrence in the South Platte River Gravel Pit Storage and Aquifer Storage Sites

Name	Status*	Habitat	Potential for Occurrence in Study Area**				
	State, BLM, USFS, CNHP		South Platte River Facilities				Denver Basin Aquifer Facilities
			Storage	Diversion	Conveyance	Treatment	
Birds							
American peregrine falcon <i>Falco peregrinus anatum</i>	SC, USFS, BLM, G4T4/S2B	Nests on cliffs, forages over many habitats.	3	3	1	1	1
American white pelican <i>Pelecanus erythrorhynchos</i>	BLM, G3/S1B	Summers on large reservoirs. No breeding in Project area.	3	1	1	1	3
Bald eagle <i>Haliaeetus leucocephalus</i>	Bald and Golden Eagle Protection Act, SC, BLM, USFS, G5/S1B, S3N	Large bodies of open water near tall trees and prairie dog colonies, especially in winter.	5	5	4	4	3
Barrow’s goldeneye <i>Bucephala islandica</i>	G5/S2B	Winter on reservoirs and rivers; summer in mountain reservoirs and ponds in forested areas. No known breeding in Project area.	3	3	1	1	1
Long-billed curlew <i>Numenius americanus</i>	SC, BLM, USFS, G5/S2B	May occur in migration in shortgrass prairie.	1	1	1	1	1
Ovenbird <i>Seiurus aurocapillus</i>	G5/S2B	Rare migrant in lowland riparian forest, shrublands, and wooded urban areas.	1	2	2	2	1
Snowy egret <i>Egretta thula</i>	G5/S2B	Reservoirs, grassy marshes, wet meadows, and rivers. May occur during migration in Project sites.	3	4	1	2	1
White-faced ibis <i>Plegadis chihi</i>	BLM, G5/S2B	May occur in migration in wet meadows, marsh edges, and reservoir shorelines.	3	3	1	1	1
Mammals							
Black-tailed prairie dog <i>Cynomys ludovicianus</i>	SC, BLM, USFS, G4/S3	Short and mixed grass prairie along Front Range.	1	5	5	1	1
Swift fox <i>Vulpes velox</i>	SC, BLM, USFS, G3/S3	Shortgrass prairie.	1	1	1	1	1

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Special Status Species List

Table G-4 (continued)
Other Special Status Species and their Occurrence in the South Platte River Gravel Pit Storage and Aquifer Storage Sites

Name	Status*	Habitat	Potential for Occurrence in Study Area**				
	State, BLM, USFS, CNHP		South Platte River Facilities				Denver Basin Aquifer Facilities
			Storage	Diversion	Conveyance	Treatment	
Amphibians							
Northern leopard frog <i>Lithobates pipiens</i>	SC, BLM, USFS, G5/S3	Usually under 9,500 feet near permanent water, including the margins of ponds, lakes, streams, and in marshes.	3	3	3	1	2
Reptiles							
Common garter snake <i>Thamnophis sirtalis</i>	SC	Marshes, ponds, and stream edges.	4	4	4	1	2
Invertebrates							
Swampy lymnaea (mollusk) <i>Lymnaea stagnalis</i>	G5/S2	No specific distribution available. In water.	2	2	1	1	1
Glass physa (mollusk) <i>Physa skinneri</i>	G5/S2	Shallow bodies of water, either perennial or seasonal, such as temporary ponds, and backwaters along streams.	2	2	1	1	1
Umbilicate sprite (mollusk) <i>Promenetus umbilicatellus</i>	G4/S3	Occurs in lakes/reservoirs.	2	1	1	1	1
Painted damsel (butterfly) <i>Hesperagrion heterodoxum</i>	G5/S1	Creeks and streams with emergent vegetation. Reported from Boulder and Larimer counties.	1	1	1	1	1
Cross-line skipper (butterfly) <i>Polites origenes</i>	G4G5/S3	Open grassy areas, prairies hills, powerline cuts, and forest openings.	1	1	1	1	2
Rhesus skipper (butterfly) <i>Polites rhesus</i>	G4/S2S3	Short and mixed-grass prairie. Caterpillar host plant is blue grama; adults nectar on <i>Astragalus</i> sp. and yellow composites.	1	1	1	1	1
Plants							
Forktip three-awn <i>Aristida basiramea</i>	G5/S1	Dry, open, sandy soils in grassland and sandstone outcrops.	1	1	1	1	1
Dwarf milkweed <i>Asclepias uncialis</i> ssp. <i>uncialis</i>	BLM, USFS, G3G4T2T3/S2	Shortgrass prairie, on sandstone-derived soils and gravelly or rocky slopes. Elev. 4,000 to 6,500 feet.	1	1	2	1	1
Gayfeather, Rocky Mountain blazing star <i>Liatris ligulistylis</i>	G5?/S2	Wet meadows and moist swales, lower elevations.	2	2	2	1	1
Rocky Mountain bulrush <i>Schoenoplectus saximontanus</i>	G5/S1	Prairies and open woodland.	2	2	2	2	2

Appendix G-1 Special Status Species List

Table G-4 (continued)
Other Special Status Species and their Occurrence in the South Platte River Gravel Pit Storage and Aquifer Storage Sites

Name	Status*	Habitat	Potential for Occurrence in Study Area**				
			South Platte River Facilities				Denver Basin Aquifer Facilities
			Storage	Diversion	Conveyance	Treatment	
Lesser bladderwort <i>Utricularia minor</i>	USFS, G5/S2	Montane fens and seeps, freshwater marshes.	1	1	1	1	1
Prairie violet <i>Viola pedatifida</i>	G5/S2	Prairies, open woodlands, and forest openings.	1	1	2	1	2

Notes:

Species lists and status from CDOW, 2010; USFS, 2010; USFS, 2011; BLM, 2009; CNHP, 2010.

*Status:

State: BLM = Listed as sensitive by Bureau of Land Management.

SC = Colorado Parks and Wildlife special concern.

USFS = U.S. Forest Service Region 2 – Threatened, Endangered and Sensitive Plants and Animals. Sensitive species are those for which population viability is a concern as evidenced by: a) significant current or predicted downward trends in population numbers or density; or b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

CNHP Rank Definition:

G1 = Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 = Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 = Secure—Common; widespread and abundant.

S1 = Critically Imperiled—Critically imperiled in the nation or State/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the State/province.

S2 = Imperiled—Imperiled in the nation or State/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or State/province.

S3 = Vulnerable—Vulnerable in the nation or State/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 = Secure—Common, widespread, and abundant in the nation or State/province.

T = Status of intraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

? = Uncertainty about the rank, could be higher or lower.

**Codes to Occurrence in Study Area:

1 = Not present – Habitat is unsuitable or outside current known range.

2 = Unlikely – Based on marginal habitat, rarity of occurrence and/or range. Also includes areas habitat is suitable, but not found during presence/absence surveys or considered unlikely to occur by detailed habitat evaluation.

3 = Potentially present – Habitat suitable or marginal. Wide-ranging species may occur occasionally during foraging or migration but Project area do not have important habitat. No documentation of presence for sedentary species.

4 = Known or likely to occur.

5 = Known or likely to occur, key habitat features present.

Appendix G-1

Special Status Species List

Table G-5
Other Special Status Species and their Occurrence in the River Segments

Name	Status*	Habitat	Potential for Occurrence in Study Area**							
	State, BLM, USFS, CNHP		River Segments							
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (Upstream)	S. Boulder Creek (Down- stream)	N. Fork S. Platte	S. Platte
Birds										
American bittern <i>Botaurus lentiginosus</i>	USFS	Large wetlands with tall emergent vegetation.	3	1	3	1	1	1	1	3
American peregrine falcon <i>Falco peregrinus anatum</i>	USFS, BLM, SC	Nests on cliffs, forages over many habitats.	2	2	4	4	4	4	4	4
American white pelican <i>Pelecanus erythrorhynchos</i>	BLM, G3/S1B	Summers on large reservoirs. No breeding in Project area.	1	1	1	1	1	1	1	4
Bald eagle <i>Haliaeetus leucocephalus</i>	Bald and Golden Eagle Protection Act, SC, BLM, USFS, G5/S1B, S3N	Large bodies of open water near tall trees and prairie dog colonies, especially in winter.	5	5	5	5	1	1	5	5
Barrow’s goldeneye <i>Bucephala islandica</i>	G5/S2B	Winter on reservoirs and rivers; summer in mountain reservoirs and ponds in forested areas.	1	1	3	1	1	1	1	3
Black tern <i>Chlidonias niger</i>	USFS	Aquatic habitat with emergent vegetation on the plains and mountain parks.	1	1	2	1	1	1	1	2
Greater sandhill crane <i>Grus canadensis tabida</i>	SC, G5T4/S2B,S4N	May occur in migration on mudflats around reservoirs in moist meadows and agricultural areas.	1	1	1	2	1	1	3	3
Ovenbird <i>Seiurus aurocapillus</i>	G5/S2B	Rare migrant in lowland riparian forest, shrublands, and wooded urban areas.	1	1	1	1	1	1	1	3
Snowy egret <i>Egretta thula</i>	G5/S2B	Reservoirs, grassy marshes, wet meadows, and rivers. May occur during migration in Project sites.	1	1	1	1	1	1	3	4
White-faced ibis <i>Plegadis chihi</i>	BLM, G5/S2B	May occur in migration in wet meadows, marsh edges, and reservoir shorelines.	1	1	1	1	1	1	1	4

Appendix G-1
Special Status Species List

Table G-5 (continued)
Other Special Status Species and their Occurrence in the River Segments

Name	Status*	Habitat	Potential for Occurrence in Study Area**							
	State, BLM, USFS, CNHP		River Segments							
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (Upstream)	S. Boulder Creek (Downstream)	N. Fork S. Platte	S. Platte
Amphibians										
Northern leopard frog <i>Lithobates pipiens</i>	SC, BLM, USFS, G5/S3	Usually under 9,500 feet near permanent water, including the margins of ponds, lakes, streams, and in marshes.	3	3	4	3	3	3	3	3
Wood frog <i>Lithobates sylvatica</i>	SC, USFS, G5/S3	Subalpine ponds, marshes, stream margins and adjoining wet meadows, willows and forests.	1	1	1	1	1	1	1	1
Reptiles										
Common garter snake <i>Thamnophis sirtalis</i>	SC	Marshes, ponds, and stream edges.	1	1	1	1	1	1	1	4
Fishes										
Colorado River cutthroat trout <i>Oncorhynchus clarki pleuriticus</i>	SC, BLM, USFS, G4T3/S3	Primarily isolated to headwater streams and lakes.	5	5	2	2	1	1	1	1
Iowa darter <i>Etheostoma exile</i>	SC, G5/S3	Streams and ponds in NE Colorado, as well as Elevenmile Canyon Reservoir and Plum Creek in Douglas County (NDIS 2011). Record from North Fork South Platte.	1	1	1	1	1	1	1	5
Mountain sucker <i>Catostomus platyrhynchus</i>	SC, BLM, USFS, G5/S2?	Lotic water, from small montane streams to large rivers. Have been collected in lakes and reservoirs. Common in streams with low gradient segments that consist of a mix of riffles, pools, and runs.	1	1	1	1	1	1	1	1
Roundtail chub <i>Gila robusta</i>	SC, BLM, USFS, G3/S2	Only in Colorado River basin/Upper Colorado River in western Colorado.	1	1	1	1	1	1	1	1

Appendix G-1

Special Status Species List

Table G-5 (continued)
Other Special Status Species and their Occurrence in the River Segments

Name	Status*	Habitat	Potential for Occurrence in Study Area**							
	State, BLM, USFS, CNHP		River Segments							
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (Upstream)	S. Boulder Creek (Downstream)	N. Fork S. Platte	S. Platte
Invertebrates										
Rocky Mountain capshell snail <i>Acroloxus coloradensis</i>	SC, USFS, G3/S1	Known in Colorado from a small number of lakes between 8,800 and 9,800 feet.	1	1	1	1	1	1	1	1
Plants										
Park milkvetch <i>Astragalus leptaleus</i>	USFS, G4/S2	Montane; sedge meadows, grassy stream banks; 7,500-10,000 feet.	2	2	2	2	1	1	3	3
Least moonwort <i>Botrychium simplex</i>	ARNF, G5/S2	Forest seeps and streamside meadows, mostly subalpine.	3	3	1	1	1	1	1	1
Lesser panicled sedge <i>Carex diandra</i>	USFS, G5/S1	Montane and subalpine fens.	3	3	1	1	1	1	1	1
Mud sedge <i>Carex limosa</i>	ARNF, G5/S2	Fens; montane or subalpine peatlands; often as part of a floating mat community adjacent to an open water system.	3	3	1	1	1	1	1	1
Livid sedge <i>Carex livida</i>	USFS, G5/S1	Montane and subalpine fens over 6,400 feet.	2	2	1	1	1	1	1	1
Willow hawthorn <i>Crataegus saligna</i>	G3G4/S3	Canyons and riparian corridors from 5,345 to 8,600 feet in western Colorado.	1	1	3	1	1	1	1	
Yellow lady's slipper <i>Cypripedium parviflorum</i>	USFS, G5/S2	Montane and subalpine moist forest and aspen groves, 7,400 to 8,500 feet.	1	1	1	1	1	1	1	2
Buckbean <i>Menyanthes trifoliata</i>	ARNF	Upper montane and subalpine ponds.	3	3	N/A	N/A	1	1	N/A	N/A
Dwarf raspberry <i>Rubus arcticus</i> ssp. <i>acaulis</i> (<i>Cylactis arcticus</i> spp. <i>acaulis</i>)	USFS, G5T5/S1	Montane and subalpine willows and wet meadows (fens), swampy conifer forest.	3	3	1	1	1	1	1	1

Appendix G-1
Special Status Species List

Table G-5 (continued)
Other Special Status Species and their Occurrence in the River Segments

Name	Status*	Habitat	Potential for Occurrence in Study Area**							
	State, BLM, USFS, CNHP		River Segments							
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (Upstream)	S. Boulder Creek (Down- stream)	N. Fork S. Platte	S. Platte
American currant <i>Ribes americanum</i>	G5/S2	Lowland riparian areas.	1	1	1	1	1	1	3	3
Silver willow <i>Salix candida</i>	USFS, G5/S2	Foothills and montane; rich fens, pond edges, permanently saturated peatlands.	2	2	1	1	1	1	1	1
Autumn willow <i>Salix serissima</i>	USFS, G4S1	Peatlands with saturated soils (fens, willow carrs), streambanks.	3	3	2	2	2	2	2	1
Rocky Mountain bulrush <i>Schoenoplectus saximontanus</i>	G5/S1	Drawdown areas along pond margins.	1	1	1	1	1	1	1	3
Lesser bladderwort <i>Utricularia minor</i>	USFS, G5/S2	Montane fens and seeps, freshwater marshes.	3	3	2	2	2	2	2	2

Appendix G-1

Special Status Species List

Table G-5 (continued)
Other Special Status Species and their Occurrence in the River Segments

Name	Status*	Habitat	Potential for Occurrence in Study Area**							
	State, BLM, USFS, CNHP		River Segments							
			Fraser	Williams Fork	Colorado	Blue	S. Boulder Creek (Upstream)	S. Boulder Creek (Downstream)	N. Fork S. Platte	S. Platte
Sphagnum species (other than those listed as USFS sensitive) <i>Sphagnum</i> spp.	ARNF	Subalpine fens.	4	4	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Species lists and status from CDOW, 2010; USFS, 2010; USFS, 2011; BLM, 2009; CNHP, 2010.
*Status:
State: ARNF = Species of local concern for the Arapaho & Roosevelt National Forests and Pawnee National Grassland.
BLM = Listed as sensitive by Bureau of Land Management.
SC = Colorado Parks and Wildlife special concern.
USFS = U.S. Forest Service Region 2 – Threatened, Endangered and Sensitive Plants and Animals. Sensitive species are those for which population viability is a concern as evidenced by: a) significant current or predicted downward trends in population numbers or density; or b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. USFS Management Indicator Species (MIS) are discussed in Sections 3.9, 4.6.9, and 5.9 except where they are also special status species (e.g., boreal toad).

CNHP Rank Definition:

- G1 = Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
- G2 = Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
- G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
- G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- G5 = Secure—Common; widespread and abundant.
- S1 = Critically Imperiled—Critically imperiled in the nation or State/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the State/province.
- S2 = Imperiled—Imperiled in the nation or State/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or State/province.
- S3 = Vulnerable—Vulnerable in the nation or State/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- S4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- S5 = Secure—Common, widespread, and abundant in the nation or State/province.
- T = Status of intraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

****Codes to Occurrence in Study Area:**

- 1 = Not present – Habitat is unsuitable or outside current known range.
- 2 = Unlikely – Based on marginal habitat, rarity of occurrence and/or range. Also includes areas habitat is suitable, but not found during presence/absence surveys or considered unlikely to occur by detailed habitat evaluation.
- 3 = Potentially present – Habitat suitable or marginal. Wide-ranging species may occur occasionally during foraging or migration but Project area do not have important habitat. No documentation of presence for sedentary species.
- 4 = Known or likely to occur.
- 5 = Known or likely to occur, key habitat features present.
- N/A = not applicable

Appendix G-2
Biological Opinion

Initial Biological Opinion

- Letter to Chandler Peter, Corps, from Susan Linner, USFWS – December 1, 2005, containing comments on the Moffat Collection System Project Environmental Impact Statement.
 - *Enclosure: Colorado Field Office County List, Updated November 2005.*
- Letter to Chandler Peter, Corps, from Susan Linner, USFWS – September 14, 2006, regarding acceptance and concurrence of two reports regarding the Preble's meadow jumping mouse.
- Letter to Timothy Carey, Corps, from Susan Linner – July 31, 2009, containing the Biological Opinion.
 - *Enclosure: Recovery Agreement, Entered into February 14, 2000 by Denver Water and USFWS.*

Revised Biological Assessment

- December 20, 2012 E-mail to Scott Franklin, Corps, from Susan Linner, USFWS, regarding Moffat EIS Section 7 Consultation (and USFWS' plan to provide the Corps with two separate Biological Opinions).
- E-mail and Letter to Susan Linner, USFWS, from Scott Franklin, Corps – August 14, 2013, regarding Revised Biological Assessment and Request for Formal Consultation for Moffat Collection System Project; Corps File NWO-2002-80762-DEN.
 - *Attachment A – Biological Assessment and Request for Re-Initiation of Formal Consultation for Moffat Collection System Project – Federally-listed Species in Nebraska, August 14, 2013.*
 - *Attachment B – Memorandum from Denver Water to the Corps, Revised August 1, 2013.*
 - *Attachment C – Hydrology Table H-3.41 from the Moffat Collection System Project Final EIS.*
- Updated FWS Position Paper on ESA Consultations on Greenback Cutthroat Trout

Final Biological Opinion

- Letter to Kiel Downing, Corps, from Susan Linner, USFWS – December 6, 2013, containing the Final Biological Opinion.
 - *Enclosure 1: Denver Water Tabulation of Water Rights.*
 - *Enclosure 2: [Colorado River] Recovery Agreement.*

Appendix G-2

Biological Opinion

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INITIAL BIOLOGICAL OPINION

**Letter to Chandler Peter, Corps, from Susan Linner,
USFWS – December 1, 2005**



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
755 Parfet Street, Suite 361
Lakewood, Colorado 80215

IN REPLY REFER TO:
ES/CO: T&E/Species list
Mail Stop 65412

DEC - 1 2005

Mr. Chandler Peter
Regulatory Project Manager
U.S. Army Corps of Engineers
Wyoming Regulatory Office
2232 Dell Range Blvd., Suite 210
Cheyenne, Wyoming 82009-4942

Dear Mr. Peter:

The U.S. Fish and Wildlife Service (Service) received your letter dated November 2, 2005, regarding the Corp's preparation of the **Moffat Collection System Project Environmental Impact Statement (EIS)** to assess the impacts associated with increasing annual water yield; primarily, in Adams, Boulder, Denver, Jefferson, Gilpin, Grand, and Summit Counties, Colorado. These comments have been prepared under the provisions of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et. seq.) and the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327).

For your convenience, we have enclosed a list of Colorado's threatened and endangered species, as well as the counties in which they are known to occur. We do not have site specific information available to us. If questions regarding the presence of an endangered species, the extent of its habitat, or the effects of a particular action need to be resolved, the Service recommends that a knowledgeable consultant be contacted to conduct habitat assessments, trapping studies, or to provide recommendations regarding options under the ESA. Due to staffing constraints, the Colorado Field Office cannot provide you with these services.

Since 1978, the Service has consistently taken the position in its section 7 consultations that Federal agency actions resulting in existing or new water depletions to the Platte River system may affect the endangered whooping crane (*Grus americana*), endangered interior least tern (*Sterna antillarum*), threatened piping plover (*Charadrius melodus*), endangered pallid sturgeon (*Scaphirhynchus albus*), threatened bald eagle (*Haliaeetus leucocephalus*), endangered Eskimo curlew (*Numenius borealis*), threatened western prairie fringed orchid (*Platanthera praeclara*), and designated critical habitat for the whooping crane and piping plover in the central Platte River in Nebraska. In general, depletions include evaporative losses and/or consumptive use less return flows. Project elements that could be associated with depletions to the Platte River system include, but are not limited to, ponds (detention/recreation/irrigation storage), lakes (recreation/irrigation storage/municipal storage/power generation), reservoirs (recreation/irrigation storage/municipal storage/power generation), pipelines, wells, diversion structures, and water treatment facilities.

The Service also believes that major causes for the decline of the Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*), and bonytail (*Gila elegans*) include the effect of impoundments and water depletion from the Colorado River and its tributaries. The Service believes that any action made possible by the project that causes a depletion of water from the Upper Colorado River Basin should prompt a "may affect" finding by the Corps for the listed fishes and necessitate consultation under the ESA.

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12/15/05

If the Corps and the applicant determine that there are depletions associated with the proposed project, the Corps should request initiation of formal section 7 consultation in a letter to my office. A request for initiation of formal section 7 consultation on water-related projects associated with depletions to the central Platte River and upper Colorado River basin should include a complete project description including water-related project elements and origin of water associated with the proposed project; an estimate of the amount and timing (by month) of average annual water depletion (both existing and new depletions); and describe methods of arriving at such estimates. Completion of the consultation will be based on the date of receipt of the information required to conduct the consultation.

If a formal section 7 consultation is required, the Service will make every effort to accommodate the applicant's schedules to prevent project delays. If your office or the applicant would like to discuss the proposed project in relation to Colorado River and/or Platte River system depletive issues in Colorado, please contact Sandy Vana-Miller in my office at (303) 275-2370.

Sincerely,



Susan C. Linner
Colorado Field Supervisor

Enclosure: Species List

cc: FWSR6/ES/GJ, P Schrader-Gelatt
FWSR6/ES/LK, S. Vana-Miller

Enclosure

***Colorado Field Office County List,
Updated November 2005***

Colorado Field Office County List
Updated November 2005

<p>Symbols:</p> <p>* Water depletions in the Upper Colorado River and San Juan River Basins, may affect the species and/or critical habitat in downstream reaches in other states.</p> <p>▲ Water depletions in the South Platte River may affect the species and/or critical habitat in downstream reaches in other states.</p> <p>© There is designated critical habitat for the species within the county.</p> <p>T Threatened</p> <p>E Endangered</p> <p>P Proposed</p> <p>X Experimental</p> <p>C Candidate</p>		
<p><i>For additional information contact: U.S. Fish and Wildlife Service, Colorado Field Office, 755 Parfet Street, Suite 361, Lakewood, Colorado 80215, telephone 303-275-2370</i></p> <p><i>U.S. Fish and Wildlife Service, Western Colorado Field Office, 764 Horizon Drive, Building B, Grand Junction, Colorado 81506, telephone 970-243-2778</i></p>		
Species	Scientific Name	Status
ADAMS		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
ALAMOSA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
ARAPAHOE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T

Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
ARCHULETA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pagosa skyrocket	<i>Ipomopsis polyantha</i>	C
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
BACA		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	C
BENT		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population)	<i>Sterna antillarum</i>	E
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	C
Piping plover	<i>Charadrius melodus</i>	T
BOULDER		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado butterfly plant	<i>Gaura neomexicana</i> spp. <i>coloradensis</i>	T
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T

Slender moonwort	Botrychium lineare	C
Ute ladies' -tresses	Spiranthes diluvialis	T
Whooping crane ▲	Grus americana	E
BROOMFIELD		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Colorado butterfly plant	Gaura neomexicana spp. coloradensis	T
Least tern (interior population) ▲	Sterna antillarum	E
Pallid sturgeon ▲	Scaphirhynchus albus	E
Piping plover ▲	Charadrius melodus	T
Preble's meadow jumping mouse	Zapus hudsonius preblei	T
Ute ladies' -tresses orchid	Spiranthes diluvialis	T
Whooping crane ▲	Grus americana	E
CHAFFEE		
Bald eagle	Haliaeetus leucocephalus	T
Canada lynx	Lynx canadensis	T
Gunnison sage-grouse	Centrocercus minimus	C
Mexican spotted owl	Strix occidentalis lucida	T
Uncompahgre fritillary butterfly	Boloria acrocnema	E
CHEYENNE		
Arkansas darter	Etheostoma cragini	C
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Lesser prairie chicken	Tympanuchus pallidicinctus	C
CLEAR CREEK		
Bald eagle	Haliaeetus leucocephalus	T
Canada lynx	Lynx canadensis	T
Greenback cutthroat trout	Oncorhynchus clarki stomias	T
Least tern (interior population) ▲	Sterna antillarum	E
Mexican spotted owl	Strix occidentalis lucida	T
Pallid sturgeon ▲	Scaphirhynchus albus	E
Piping plover ▲	Charadrius melodus	T
Slender moonwort	Botrychium lineare	C
Whooping crane ▲	Grus americana	E
CONEJOS		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Canada lynx	Lynx canadensis	T
Gunnison sage-grouse	Centrocercus minimus	C
Mexican spotted owl	Strix occidentalis lucida	T

Southwestern willow flycatcher	Empidonax traillii extimus	E
Yellow-billed cuckoo	Coccyzus americanus	C
COSTILLA		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Canada lynx	Lynx canadensis	T
Gunnison sage-grouse	Centrocercus minimus	C
Mexican spotted owl	Strix occidentalis lucida	T
Southwestern willow flycatcher	Empidonax traillii extimus	E
Yellow-billed cuckoo	Coccyzus americanus	C
CROWLEY		
Arkansas darter	Etheostoma cragini	C
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Least tern (interior population)	Sterna antillarum	E
Lesser prairie chicken	Tympanuchus pallidicinctus	C
Piping plover	Charadrius melodus	T
CUSTER		
Bald eagle	Haliaeetus leucocephalus	T
Canada lynx	Lynx canadensis	T
Greenback cutthroat trout	Oncorhynchus clarki stomias	T
Mexican spotted owl	Strix occidentalis lucida	T
DELTA		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Bonytail	Gila elegans	E
Canada lynx	Lynx canadensis	T
Clay-loving wild buckwheat	Eriogonum pelinophilum	E
Colorado pikeminnow©	Ptychocheilus lucius	E
Gunnison sage-grouse	Centrocercus minimus	C
Humpback chub	Gila cypha	E
Razorback sucker©	Xyrauchen texanus	E
Uinta Basin hookless cactus	Sclerocactus glaucus	T
Yellow-billed cuckoo	Coccyzus americanus	C
DENVER		
Bald eagle	Haliaeetus leucocephalus	T
Least tern (interior population) ▲	Sterna antillarum	E
Pallid sturgeon ▲	Scaphirhynchus albus	E
Piping plover ▲	Charadrius melodus	T
Preble's meadow jumping mouse	Zapus hudsonius preblei	T

Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
DOLORES		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Humpback chub*	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocnema</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
DOUGLAS		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Colorado butterfly plant	<i>Gaura neomexicana</i> spp. <i>coloradensis</i>	T
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	T
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse©	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
EAGLE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Humpback chub*	<i>Gila cypha</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocnema</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
ELBERT		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E

Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
EL PASO		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T
Slender moonwort	<i>Botrychium lineare</i>	C
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
FREMONT		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
GARFIELD		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow©	<i>Ptychocheilus lucius</i>	E
De Beque phacelia	<i>Phacelia submutica</i>	C
Humpback chub	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Parachute beardtongue	<i>Penstemon debilis</i>	C
Razorback sucker©	<i>Xyrauchen texanus</i>	E
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>	T
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
GILPIN		
Canada lynx	<i>Lynx canadensis</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E

Piping plover ▲	Charadrius melodus	T
Whooping crane ▲	Grus americana	E
GRAND		
Bald eagle	Haliaeetus leucocephalus	T
Bonytail*	Gila elegans	E
Canada lynx	Lynx canadensis	T
Colorado pikeminnow*	Ptychocheilus lucius	E
Humpback chub*	Gila cypha	E
Osterhout milkvetch	Astragalus osterhoutii	E
Penland beardtongue	Penstemon penlandii	E
Razorback sucker*	Xyrauchen texanus	E
Slender moonwort	Botrychium lineare	C
Yellow-billed cuckoo	Coccyzus americanus	C
GUNNISON		
Bald eagle	Haliaeetus leucocephalus	T
Bonytail*	Gila elegans	E
Canada lynx	Lynx canadensis	T
Colorado pikeminnow*	Ptychocheilus lucius	E
Gunnison sage-grouse	Centrocercus minimus	C
Humpback chub*	Gila cypha	E
Razorback sucker*	Xyrauchen texanus	E
Uncompahgre fritillary butterfly	Boloria acrocneuma	E
Yellow-billed cuckoo	Coccyzus americanus	C
HINSDALE		
Bald eagle	Haliaeetus leucocephalus	T
Bonytail*	Gila elegans	E
Canada lynx	Lynx canadensis	T
Colorado pikeminnow*	Ptychocheilus lucius	E
Humpback chub*	Gila cypha	E
Razorback sucker*	Xyrauchen texanus	E
Southwestern willow flycatcher	Empidonax traillii extimus	E
Uncompahgre fritillary butterfly	Boloria acrocneuma	E
Yellow-billed cuckoo	Coccyzus americanus	C
HUERFANO		
Arkansas darter	Etheostoma cragini	C
Bald eagle	Haliaeetus leucocephalus	T
Canada lynx	Lynx canadensis	T
Greenback cutthroat trout	Oncorhynchus clarki stomias	T
Mexican spotted owl	Strix occidentalis lucida	T
JACKSON		

Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
North Park phacelia	<i>Phacelia formosula</i>	E
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
JEFFERSON		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado butterfly plant	<i>Gaura neomexicana</i> spp. <i>coloradensis</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	T
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse©	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
KIOWA		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population)	<i>Sterna antillarum</i>	E
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	C
Piping plover	<i>Charadrius melodus</i>	T
KIT CARSON		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
LAKE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	T
Penland alpine fen mustard	<i>Eutrema penlandii</i>	T
Slender moonwort	<i>Botrychium lineare</i>	C
Uncompahgre fritillary butterfly	<i>Boloria acrocnema</i>	E
LA PLATA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T

Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Knowlton cactus	<i>Pediocactus knowltonii</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocynema</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
LARIMER		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado butterfly plant	<i>Gaura neomexicana</i> spp. <i>coloradensis</i>	T
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
North Park phacelia	<i>Phacelia formosula</i>	E
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse©	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
LAS ANIMAS		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
LINCOLN		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	C
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
LOGAN		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E

Piping plover	<i>Charadrius melodus</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
MESA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail©	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow©	<i>Ptychocheilus lucius</i>	E
De Beque phacelia	<i>Phacelia submutica</i>	C
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Humpback chub©	<i>Gila cypha</i>	E
Razorback sucker©	<i>Xyrauchen texanus</i>	E
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>	T
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
MINERAL		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocnema</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
MOFFAT		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail©	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow©	<i>Ptychocheilus lucius</i>	E
Humpback chub©	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker©	<i>Xyrauchen texanus</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
MONTEZUMA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Mancos milkvetch	<i>Astragalus humillimus</i>	E
Mesa Verde cactus	<i>Sclerocactus mesae-verdae</i>	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T

Razorback sucker*	Xyrauchen texanus	E
Sleeping Ute milkvetch	Astragalus tortipes	C
Southwestern willow flycatcher	Empidonax traillii extimus	E
Yellow-billed cuckoo	Coccyzus americanus	C
MONTROSE		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Bonytail*	Gila elegans	E
Canada lynx	Lynx canadensis	T
Clay-loving wild buckwheat	Eriogonum pelinophilum	E
Colorado pikeminnow*	Ptychocheilus lucius	E
Gunnison sage-grouse	Centrocercus minimus	C
Humpback chub*	Gila cypha	E
Mexican spotted owl	Strix occidentalis lucida	T
Razorback sucker*	Xyrauchen texanus	E
Uinta Basin hookless cactus	Sclerocactus glaucus	T
Yellow-billed cuckoo	Coccyzus americanus	C
MORGAN		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Least tern (interior population)	Sterna antillarum	E
Pallid sturgeon ▲	Scaphirhynchus albus	E
Piping plover	Charadrius melodus	T
Preble's meadow jumping mouse	Zapus hudsonius preblei	T
Ute ladies'-tresses orchid	Spiranthes diluvialis	T
Whooping crane ▲	Grus americana	E
OTERO		
Arkansas darter	Etheostoma cragini	C
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Least tern (interior population)	Sterna antillarum	E
Piping plover	Charadrius melodus	T
OURAY		
Bald eagle	Haliaeetus leucocephalus	T
Bonytail*	Gila elegans	E
Canada lynx	Lynx canadensis	T
Colorado pikeminnow*	Ptychocheilus lucius	E
Gunnison sage-grouse	Centrocercus minimus	C
Humpback chub*	Gila cypha	E
Razorback sucker*	Xyrauchen texanus	E
Uncompahgre fritillary butterfly	Boloria acrocnema	E

Yellow-billed cuckoo	Coccyzus americanus	C
PARK		
Bald eagle	Haliaeetus leucocephalus	T
Canada lynx	Lynx canadensis	T
Greenback cutthroat trout	Oncorhynchus clarki stomias	T
Least tern (interior population) ▲	Sterna antillarum	E
Mexican spotted owl	Strix occidentalis lucida	T
Pallid sturgeon ▲	Scaphirhynchus albus	E
Pawnee montane skipper	Hesperia leonardus montana	T
Penland alpine fen mustard	Eutrema penlandii	T
Piping plover ▲	Charadrius melodus	T
Uncompahgre fritillary butterfly	Boloria acrocneuma	E
Whooping crane ▲	Grus americana	E
PHILLIPS		
Bald eagle	Haliaeetus leucocephalus	T
PITKIN		
Bald eagle	Haliaeetus leucocephalus	T
Bonytail*	Gila elegans	E
Canada lynx	Lynx canadensis	T
Colorado pikeminnow*	Ptychocheilus lucius	E
Humpback chub*	Gila cypha	E
Mexican spotted owl	Strix occidentalis lucida	T
Razorback sucker*	Xyrauchen texanus	E
Uncompahgre fritillary butterfly	Boloria acrocneuma	E
Yellow-billed cuckoo	Coccyzus americanus	C
PROWERS		
Arkansas darter	Etheostoma cragini	C
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Least tern (interior population)	Sterna antillarum	E
Lesser prairie chicken	Tympanuchus pallidicinctus	C
Piping plover	Charadrius melodus	T
PUEBLO		
Arkansas darter	Etheostoma cragini	C
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Canada lynx	Lynx canadensis	T
Greenback cutthroat trout	Oncorhynchus clarki stomias	T
Mexican spotted owl	Strix occidentalis lucida	T

RIO BLANCO		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow®	<i>Ptychocheilus lucius</i>	E
Dudley Bluffs bladderpod	<i>Lesquerella congesta</i>	T
Dudley Bluffs twinpod	<i>Physaria obcordata</i>	T
Graham beardtongue	<i>Penstemon grahamii</i>	C
Humpback chub*	<i>Gila cypha</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
White River beardtongue	<i>Penstemon scariousus</i> var. <i>albifluvis</i>	C
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
RIO GRANDE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocnema</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
ROUTT		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Humpback chub*	<i>Gila cypha</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SAGUACHE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Humpback chub*	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E

Uncompahgre fritillary butterfly	<i>Boloria acrocne</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SAN JUAN		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocne</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SAN MIGUEL		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Gunnison sage-grouse	<i>Centrocercus minimus</i>	C
Humpback chub*	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocne</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SEDGWICK		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Least tern (interior population)	<i>Sterna antillarum</i>	E
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover	<i>Charadrius melodus</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
SUMMIT		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Humpback chub*	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Penland alpine fen mustard	<i>Eutrema penlandii</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Slender moonwort	<i>Botrychium lineare</i>	C
Uncompahgre fritillary butterfly	<i>Boloria acrocne</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C

TELLER		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	T
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse ©	<i>Zapus hudsonius preblei</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
WASHINGTON		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
WELD		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Colorado butterfly plant	<i>Gaura neomexicana</i> spp. <i>coloradensis</i>	T
Least tern (interior population) ▲	<i>Sterna antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
YUMA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T

**Letter to Chandler Peter, Corps, from Susan Linner,
USFWS – September 14, 2006**



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
P.O. Box 25486, DFC (MS 65412)
Denver, Colorado 80225-0486

REPLY REFER TO:

ES/CO: T&E/PMJM/trapping

TAILS: 65412-2006-I-0418

SEP 14 2006

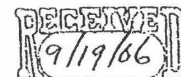
Chandler J. Peter
U.S. Army Corps of Engineers
2232 Dell Ranch Boulevard, Suite 210
Cheyenne, Wyoming 82009

Dear Mr. Peter:

U.S. Fish and Wildlife Service (Service) is responding to your letter of August 18, 2006, requesting review of two reports regarding the Preble's meadow jumping mouse, *Zapus hudsonius preblei* (Preble's) as related to the Moffat Collection System Project. They are: 1) a 2005 trapping survey at Leyden Gulch, Jefferson County, Colorado (Section 20, Township 2 South, Range 70 West) and 2) a habitat evaluation of three streams (Forsythe Gulch, Winiger Gulch, and South Boulder Creek) that are tributaries to Gross Reservoir, Boulder County, Colorado (Section 19, Township 1 South, Range 71 West and Section 30, Township 1 South, Range 72 West). The following comments are provided under the authority conferred to the Service by the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

Based on the information provided, the Service finds the reports acceptable and concurs that populations of Preble's are not likely to be present within the subject areas. Therefore, the Service concludes that project activities impacting these sites should not have direct adverse affects to Preble's or Preble's habitat. While a Preble's population is unlikely to exist downstream on Leyden Gulch, a Preble's populations is present downstream from Gross Reservoir along South Boulder Creek. Actions at Gross Reservoir that result in significant modifications of Preble's habitat downstream (for example, through alteration of existing flow regimes) may be subject to provisions of the ESA.

Should additional information regarding listed or proposed species become available, this determination may be reconsidered under the ESA. On February 2, 2005, Preble's was proposed for delisting in the *Federal Register* (Vol 70 No. 21 FR 5404). Until a final determination is made, Preble's remains protected as a threatened species under the ESA.



If we can be of further assistance, please contact Peter Plage of my staff at (303) 236-4750.

Sincerely,



Susan C. Linner
Colorado Field Supervisor

pc: Plage
Vana-Miller

PPlage:PMJMSurvey\2006.46.091206

**Letter to Timothy Carey, Corps, from
Susan Linner – July 31, 2009**



United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
COLORADO FIELD OFFICE
P.O. BOX 25486, DFC (MS 65412)
DENVER, COLORADO 80225-0486

IN REPLY REFER TO:
ES/LK-6-CO-09-F-021
ES/GJ-6-CO-99-F-033-CP101
TAILS 65412-2009-F-0520

July 31, 2009

Mr. Timothy Carey
Denver Regulatory Office
U.S. Army Corps of Engineers
9307 S. Wadsworth Boulevard
Littleton, Colorado 80218-6901

Dear Mr. Carey:

This final biological opinion is provided in response to your February 20, 2009, request to initiate formal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA). Your two biological assessments (BAs) described the potential effects of the City and County of Denver's Moffat Collection System Project (Project), U.S. Army Corps of Engineers (Corps) permit application number NWO-2002-80762-DEN, on federally listed species and designated critical habitat.

The Federal action reviewed in this biological opinion is the operation of the proposed expanded Gross Reservoir located in Boulder County, Colorado. The City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water), proposes to enlarge the existing 41,811 acre-foot reservoir by 72,000 acre-feet to a total storage capacity of 113,811 acre-feet. This would be accomplished by raising the existing, concrete gravity arch dam. The proposed Project would also increase stream diversions in Summit, Grand, Park, Douglas, and Boulder Counties.

The U.S. Fish and Wildlife Service (Service) has reviewed the information contained in the BAs submitted by your office on February 20, 2009. We concur with your determinations of "likely to adversely affect" for the endangered whooping crane (*Grus Americana*), least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirynchus albus*), the threatened northern great plains population of the piping plover (*Charadrius melodus*), and the western prairie fringed orchid (*Platanthera praeclara*) in the central and lower Platte River in Nebraska. We also concur with your determination of "likely to adversely affect" for designated whooping crane critical habitat in Nebraska. We concur with your determinations of "not likely to adversely affect" for the endangered American burying beetle (*Nicrophorus americanus*), and "no effect" for the endangered Eskimo curlew (*Numenius borealis*) in Nebraska.



The Service also concurs with your determinations of "likely to adversely affect" for the endangered Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and their designated critical habitat in the upper Colorado River basin.

We concur with your determinations of "not likely to adversely affect" for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*), Ute ladies'-tresses orchid (*Spiranthes diluvialis*), and the greenback cutthroat trout (*Oncorhynchus clarki stomias*) in Colorado. We also concur with your determinations of "no effect" for the Canada lynx (*Lynx canadensis*), Mexican spotted owl (*Strix occidentalis lucida*), and yellow-billed cuckoo (*Coccyzus americanus*) in Colorado.

DESCRIPTION OF THE FEDERAL ACTION

The Federal action is Denver Water's need for a section 404 individual permit from the Corps for the proposed Project for the expansion of Gross Reservoir, which is located approximately 35 miles northwest of Denver and 6 miles southwest of the City of Boulder in Boulder County. Denver Water proposes to enlarge the existing 41,811 acre-foot reservoir by 72,000 acre-feet, for a total storage capacity of 113,811 acre-feet. This would be accomplished by raising the existing, concrete gravity arch dam by 125 feet; from 340 feet to 465 feet in height. The surface area of the reservoir would be expanded from about 418 acres to 818 acres, which would inundate approximately 400 acres of surrounding shoreline. Using existing collection infrastructure, water from the Fraser River, Williams Fork River, and South Boulder Creek would be diverted and delivered during average to wet years via the Moffat Tunnel and South Boulder Creek to Gross Reservoir.

The purpose of the Project is to develop 18,000 acre-feet per year of new, annual firm yield to the Moffat Water Treatment Plant (WTP) and raw water customers upstream of the Moffat WTP pursuant to the Board of Water Commissioners' commitment to its customers. Denver Water's need for the Project is to address two major issues: 1) timeliness - the overall near-term water supply shortage; and 2) location - the imbalance in water storage and supply between the north and south systems.

In order to firm this water supply and provide 18,000 acre-feet per year of new firm yield, an additional 72,000 acre-feet of storage capacity is necessary. Existing facilities, including the South Boulder Diversion Canal and Conduits 16/22, would be used to deliver water from the enlarged Gross Reservoir to the Moffat WTP and raw water customers. To meet future demands, in most years, Denver Water would continue to rely on supplies from its entire integrated collections system. In a drought or emergency, Denver Water would rely on the additional water it would have previously stored in the Moffat Collection System to provide the additional 18,000 acre-feet of yield.

The proposed Project would result in a combination of existing and new depletions to the Platte River system above the Loup River confluence. These depletions are associated with changes in operation of Denver Water's collection system. Denver Water would divert an additional 2,367 acre-feet per year on average from the South Platte River at Strontia Springs and Conduit 20; and

an additional 985 acre-feet per year on average from South Boulder Creek at Gross Reservoir and the South Boulder Diversion Canal, for use in its municipal water system. Overall, average annual diversions from the South Platte River would increase by 3,274 acre-feet per year. The amount of diverted water would be greater than the amount of depletions from the South Platte River basin because much of the additional diverted water would return to the river via return flows from wastewater treatment plants and lawn irrigation; the average annual depletion from the South Platte River basin would be 1,607 acre-feet per year.

The proposed Project also would result in additional water depletions from the upper Colorado River basin of 15,121 acre-feet/year. Average annual diversions from the upper Colorado River would increase by 10,285 acre-feet/year through the Moffat Tunnel, which includes water diverted from the Fraser River and from the Williams Fork River via the Gumlick Tunnel. An additional 4,836 acre-feet/year would be diverted through the Roberts Tunnel, which diverts water from the Blue River. Increased diversions would decrease flows in the Colorado River primarily during the summer months, especially June and July.

PLATTE RIVER

BACKGROUND

On June 16, 2006, the Service issued a programmatic biological opinion (PBO) for the Platte River Recovery Implementation Program (PRRIP) and water-related activities^a affecting flow volume and timing in the central and lower reaches of the Platte River in Nebraska. The action area for the PBO included the Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence.

The Federal action addressed by the PBO included the following:

- 1) funding and implementation of the PRRIP for 13 years, the anticipated first stage of the PRRIP; and
- 2) continued operation of existing and certain new water-related activities^b including, but not limited to, Bureau of Reclamation (Reclamation) and Service projects that are (or may become) dependent on the PRRIP for ESA compliance during the first 13-year stage of the PRRIP for

^a The term “water-related activities” means activities and aspects of activities which (1) occur in the Platte River basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a “water related activity” to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of “water related activities” do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing.

^b “Existing water related activities” include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. “New water-related activities” include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

their effects on the target species^c, whooping crane critical habitat, and other federally listed species^d that rely on central and lower Platte River habitats.

The PBO established a two-tiered consultation process for future Federal actions on existing and new water-related activities subject to section 7(a)(2) of the ESA, with issuance of the PBO being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations covered by the PBO. Under this tiered consultation process, the Service will produce tiered biological opinions when it is determined that future federal actions are “likely to adversely affect” federally listed species and/or designated critical habitat in the PRRIP action area and the Project is covered by the PBO. If necessary, the biological opinions will also consider potential effects to other listed species and critical habitat affected by the Federal action that were not within the scope of the Tier 1 PBO (e.g., direct or indirect effects to listed species occurring outside of the PRRIP action area).

Although the water depletive effects of this Federal action to central and lower Platte River species have been addressed in the PBO, when “no effect”, or “may affect” but “not likely to adversely affect” determinations are made on a site-specific basis for the target species in Nebraska, the Service will review these determinations and provide written concurrence where appropriate. Upon receipt of written concurrence, section 7(a)(2) consultation will be considered completed for those Federal actions.

Water-related activities requiring Federal approval will be reviewed by the Service to determine if: (1) those activities comply with the definition of existing water-related activities and/or (2) proposed new water-related activities are covered by the applicable states or the Federal depletions plan. The Service has determined that the Project meets the above criteria and, therefore, this Tier 2 biological opinion regarding the effects of the Project on the target species, whooping crane critical habitat, and the western prairie fringed orchid in the central and lower Platte River can tier from the June 16, 2006, PBO.

CONSULTATION HISTORY

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service’s determination of the effects of the Federal action analyzed in the PBO.

The Service determined in the Tier 1 PBO that the Federal action, including the continued operation of existing and certain new water-related activities, may adversely affect but would not likely jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, western prairie fringed orchid, and bald eagle (*Haliaeetus leucocephalus*) in the central and lower Platte River. Further, the Service determined that the Federal action, including

^c The “target species” are the endangered whooping crane, the interior least tern, the pallid sturgeon, and the threatened northern Great Plains population of the piping plover.

^d Other listed species present in the central and lower Platte River include the western prairie fringed orchid, American burying beetle, and Eskimo curlew.

the continued operation of existing and certain new water-related activities, was not likely to destroy or adversely modify designated critical habitat for the whooping crane. The bald eagle was subsequently removed from the Federal endangered species list on August 8, 2007. Bald eagles continue to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. For more information on bald eagles, see the Service's webpage at: <http://www.fws.gov/migratorybirds/BaldEagle.htm>

The Service also determined that the PBO Federal action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal action, including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered american burying beetle.

The effects of the continued operation of existing and certain new water-related activities on the remaining species and critical habitats listed in Table II-1 of the PBO were beyond the scope of the PBO and were not considered.

SCOPE OF THE TIER 2 BIOLOGICAL OPINION

The proposed Project is a component of "the continued operation of existing and certain new water-related activities" needing a Federal action evaluated in the Tier 1 PBO, and flow-related effects of the Federal action are consistent with the scope and the determination of effects in the June 16, 2006 PBO. Because Denver Water has elected to participate in the PRRIP, ESA compliance for flow-related effects to federally listed endangered and threatened species and designated critical habitat from the Project is provided to the extent described in the Tier 1 PBO.

This biological opinion applies to the Project's effects to listed endangered and threatened species and designated critical habitat as described in the PBO for the first thirteen years of the PRRIP (i.e., the anticipated duration of the first PRRIP increment).

STATUS OF THE SPECIES/CRITICAL HABITAT

Species descriptions, life histories, population dynamics, status and distributions are fully described in the PBO on pages 76-156 for the whooping crane, interior least tern, piping plover, pallid sturgeon and western prairie fringed orchid, and whooping crane critical habitat and are hereby incorporated by reference. Since issuance of the Service's PBO, there have been no substantial changes in the status of the target species/critical habitat other than the bald eagle delisting previously mentioned.

ENVIRONMENTAL BASELINE

The Environmental Baseline sections for the Platte River and for the whooping crane, interior least tern, piping plover, pallid sturgeon and western prairie fringed orchid, and whooping crane critical habitat are described on pages 157 to 219 of the Tier 1 PBO, and are hereby incorporated

by reference. Since issuance of the Tier 1 PBO, there have been no substantial changes in the status of the target species/critical habitat in the action area other than the bald eagle delisting.

EFFECTS OF THE ACTION

Based on our analysis of the information provided in your BAs for the Project, the Service concludes that the proposed Federal action will result in a combination of existing and new depletions to the Platte River system above the Loup River confluence. These depletions are associated with changes in operation of Denver Water's collection system. Denver Water would divert an additional 2,367 acre-feet per year on average from the South Platte River at Strontia Springs and Conduit 20; and an additional 985 acre-feet per year on average from South Boulder Creek at Gross Reservoir and the South Boulder Diversion Canal, for use in its municipal water system. Overall, average annual diversions from the South Platte River would increase by 3,274 acre-feet per year. The amount of diverted water would be greater than the amount of depletions from the South Platte River basin because much of the additional diverted water would return to the river via return flows from wastewater treatment plants and lawn irrigation; the average annual depletion from the South Platte River basin would be 1,607 acre-feet per year.

As both an existing and new water-related activity, we have determined that the flow-related adverse effects of the Project are consistent with those evaluated in the Tier 1 PBO for the whooping crane, interior least tern, piping plover, pallid sturgeon, western prairie fringed orchid, and whooping crane critical habitat, and these effects on flows are being addressed in conformance with the Colorado plan for future depletions of the PRRIP.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, local, or private (non-Federal) actions that are reasonably certain to occur in the action area considered in this biological opinion. A non-Federal action is "reasonably certain" to occur if the action requires the approval of a state or local resource or land-control agency, such agencies have approved the action, and the Project is ready to proceed. Other indicators which may also support such a "reasonably certain to occur" determination include whether: a) the Project sponsors provide assurance that the action will proceed; b) contracting has been initiated; c) state or local planning agencies indicate that grant of authority for the action is imminent; or d) where historic data have demonstrated an established trend, that trend may be forecast into the future as reasonably certain to occur. These indicators must show more than the possibility that the non-Federal project will occur; they must demonstrate with reasonable certainty that it will occur. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA and would be consulted on at a later time.

Cumulative effects are described on pages 194 to 300 of the Tier 1 PBO, and are hereby incorporated by reference. Since the Tier 1 PBO was issued, there have been no substantial changes in the status of cumulative effects.

CONCLUSION

The Service concludes that the proposed Moffat Collection System Project is consistent with the Tier 1 PBO for effects to listed species and critical habitat addressed in the Tier 1 PBO. After reviewing site specific information, including: 1) the scope of the Federal action, 2) the environmental baseline, 3) the status of the whooping crane, interior least tern, piping plover, pallid sturgeon, and the western prairie fringed orchid in the central and lower Platte River and their potential occurrence within the Project area, as well as whooping crane critical habitat, 4) the effects of the Project, and 5) any cumulative effects, it is the Service's biological opinion that the Project, as described, is not likely to jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern great plains population of the piping plover, or western prairie fringed orchid in the central and lower Platte River. The Federal action is also not likely to destroy or adversely modify designated critical habitat for the whooping crane.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibits the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct, and applies to individual members of a listed species. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Sections 7(b)(4) and 7(o)(2) of the ESA do not apply to the incidental take of federally listed plant species (e.g., Colorado butterfly plant (*Gaura neomexicana coloradensis*), Ute ladies'-tresses orchid, and western prairie fringed orchid). However, limited protection of listed plants from take is provided to the extent that ESA prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on non-Federal areas in violation of state law or regulation or in the course of any violation of a state criminal trespass law. Such laws vary from state to state.

The Department of the Interior, acting through the Service and Reclamation, is implementing all pertinent reasonable and prudent measures and implementing terms and conditions stipulated in the Tier 1 PBO incidental take statement (pages 309-326 of the PBO) which will minimize the anticipated incidental take of federally listed species. In instances where the amount or extent of incidental take outlined in the Tier 1 PBO is exceeded, or the amount or extent of incidental take

for other listed species is exceeded, the specific PRRIP action(s) causing such take shall be subject to reinitiation expeditiously.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations are provided in the PBO (pages 328-329) and are hereby incorporated by reference.

REINITIATION AND CLOSING STATEMENT

Any person or entity undertaking a water-related activity that receives Federal funding or a Federal authorization and which relies on the PRRIP as a component of its ESA compliance in section 7 consultation must agree: (1) to the inclusion in its Federal funding or authorization documents of reopening authority, including reopening authority to accommodate reinitiation upon the circumstances described in section IV.E. of the program document, which addresses program termination; and (2) to request appropriate amendments from the Federal action agency as needed to conform its funding or authorization to any PRRIP adjustments negotiated among the three states and the Department of the Interior, including specifically new requirements, if any, at the end of the first PRRIP increment and any subsequent PRRIP increments. The Service believes that the PRRIP should not provide ESA compliance for any water-related activity for which the funding or authorization document does not conform to any PRRIP adjustments (Program Document, section VI).

Reinitiation of consultation over the Moffat Collection System Project will not be required at the end of the first 13-years of the PRRIP provided a subsequent program increment or first increment program extension is adopted pursuant to appropriate ESA and NEPA compliance procedures, and, for a subsequent increment, the effects of the Project are covered under a Tier 1 PBO for that increment addressing continued operation of previously consulted-on water-related activities.

COLORADO RIVER

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative to avoid jeopardy to the endangered fishes by depletions from the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On December 20, 1999, the Service issued the final programmatic biological opinion for Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program actions in the Upper Colorado River above the Confluence with the Gunnison River (this document is available for viewing at the following internet address: <http://www.r6.fws.gov/crrip/biological.htm>). The Service has determined that projects that fit under the umbrella of the Colorado River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Service has determined that if the subject Project meets the following criteria, then it fits under the umbrella of the Colorado River PBO.

1. The Project depletes water from the Colorado River above the confluence with the Gunnison River.
2. The applicant signs the Recovery Agreement. The Service and Denver Water signed a Recovery Agreement on February 14, 2000 (copy enclosed). This Recovery Agreement was signed for a consultation with the Federal Energy Regulatory Commission on the relicense of the Gross Reservoir Hydroelectric Project, biological opinion number ES/GJ-6-CO-00-F-024, dated October 12, 2000.
3. The Moffat Collection System Project will deplete an additional 15,121 acre-feet of water from the upper Colorado River basin. In order to rely on the Recovery Program to offset the subject depletions, the Project sponsors will make a one-time monetary contribution for water depletions greater than 100 acre-feet to help fund their share of the costs of recovery actions. The one-time payment is calculated by multiplying the Project's average annual new depletion (15,121 acre-feet) by the water user's share of Recovery Program costs (the charge) in effect at the time payment is made. For Fiscal Year 2009 (October 1, 2008, to September 30, 2009), the charge is \$18.29 per acre-foot for the average annual depletion which equals a total contribution of \$276,563.09 for this Project's share of the Recovery Program costs. This amount will be adjusted annually for inflation on October 1 of each year based on the Consumer Price Index. Ten percent of the total contribution (\$27,656.30), or total payment, will be provided to the Service's designated agent, the National Fish and Wildlife Foundation (Foundation), at the time of issuance of the Federal approvals from the Corps. The balance will be due at the time the construction commences. The payment will be included by the Corps as a permit stipulation. The funds will be used for acquisition of water rights (or directly-related activities) to meet the in stream flow needs of the endangered fishes; or to support other recovery activities for the endangered fishes described in the RIPRAP. All payments should be made to the Foundation.

National Fish and Wildlife Foundation
Donna McNamara, Finance Department
1133 15th Street, NW, Suite 1100
Washington, D.C. 20005

Each payment is to be accompanied by a cover letter that identifies the project and biological opinion number ES/GJ-6-CO-99-F-033-CP101 that requires the payment, the amount of payment enclosed, and check number. A copy of the cover letter and a copy of the payment check shall

be sent to the Service office issuing this biological opinion. The cover letter also shall identify the name and address of the payor, the name and address of the Federal agency responsible for authorizing the project, and the address of the Service office conducting the section 7 consultation. This information will be used by the Foundation to notify the payor, the lead Federal agency, and the Service that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

4. The Service requests that the Corps retain discretionary Federal authority for the subject Project in case reinitiation of section 7 consultation is required.

REINITIATION NOTICE

This concludes formal consultation on the subject action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and under the following conditions:

1. The amount or extent of take specified in the incidental take statement for the Colorado River PBO is exceeded. The Service has determined that no incidental take, including harm, is anticipated to occur as a result of the depletions contemplated in this opinion because of the implementation of recovery actions. The implementation of the recovery actions contained in the Colorado River PBO will further decrease the likelihood of any take caused by depletion impacts.

2. New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in the Colorado River PBO. In preparing the Colorado River PBO, the Service describes the positive and negative effects of the action it anticipates and considered in the section of the opinion entitled "Effects of the Action." New information would include, but is not limited to, not achieving a "positive response" or a significant decline in population, as described in Appendix D of the Colorado River PBO. Significant decline shall mean a decline in excess of normal variations in population (Appendix D). The current population estimate of adult Colorado pikeminnow in the Colorado River is 600 individuals, with a confidence interval of ± 250 . Therefore, with the criteria established in Appendix D, a negative population response would trigger reinitiation if the population declined to 350 adults. The Recovery Program has developed recovery goals for the four endangered fishes. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. The Service retains the authority to determine whether a significant decline in population has occurred, but will consult with the Recovery Program's Biology Committee prior to making its determination. In the event of a significant population decline, the Service is to first rely on the Recovery Program to take actions to correct the decline. If nonflow recovery actions have not been implemented, the Service will assess the impacts of not completing these actions prior to reexamining any flow related issues.

New information would also include the lack of a positive population response by the year 2015 or when new depletions reach 50,000 acre-feet/year. According to the criteria outlined in

Appendix D of the Colorado River PBO, a positive response would require the adult Colorado pikeminnow population estimate to be 1,100 individuals (± 250) in the Colorado River (Rifle, Colorado to the confluence with the Green River). When the population estimate increases above 1,100, a new population baseline is established at the higher population level.

3. The Recovery Action Plan actions listed as part of the proposed action in the Colorado River PBO are not implemented within the required time frames. This would be considered a change in the action subject to consultation; section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is required if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery Program, as explained in the description of the proposed action. In 2003 and every 2 years thereafter, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions to determine timely compliance with applicable schedules.

4. The Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under the Colorado River PBO may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the Colorado River PBO as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are already included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

For purposes of any future reinitiation of consultation, depletions have been divided into two categories:

CATEGORY 1

A. Existing depletions, both Federal and non-Federal as described in the project description, from the Upper Colorado River Basin above the confluence with the Gunnison River that had actually occurred on or before September 30, 1995 (average annual depletion of approximately 1 million acre-feet/year);

B. Depletions associated with the total 154,645 acre-feet/year volume of Green Mountain Reservoir, including power pool (which includes but is not limited to all of the 20,000 acre-feet contract pool and historic user's pool), the Colorado Big-Thompson replacement pool; and

C. Depletions associated with Ruedi Reservoir including Round I sales of 7,850 acre-feet, Round II sales of 6,135 acre-feet/year as discussed in the Service's biological opinion to Reclamation dated May 26, 1995, and as amended on January 6, 1999, and the Fryingpan Arkansas Project replacement pool as governed by the operating principles for Ruedi Reservoir but excluding 21,650 acre-feet of the marketable yield.

Category 1 depletions shall remain as Category 1 depletions regardless of any subsequent change, exchange, or abandonment of the water rights resulting in such depletions. Category 1 depletions associated with existing facilities may be transferred to other facilities and remain in Category 1 so long as there is no increase in the amount of total depletions attributable to existing depletions. However, section 7 consultation is still required for Category 1 depletion projects when a new Federal action occurs which may affect endangered species except as provided by the criteria established for individual consultation under the umbrella of the Colorado River PBO. Reinitiation of this consultation will be required if the water users fail to provide 10,825 acre-feet/year on a permanent basis.

CATEGORY 2

Category 2 is defined as all new depletions up to 120,000 acre-feet/year, this includes all depletions not included in Category 1 that occur after 1995 regardless of whether section 7 consultation has been completed. This category is further divided into two 60,000 acre-feet/year blocks of depletions.

The recovery actions are intended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat and to result in a positive response as described in Appendix D of the Colorado River PBO for both 60,000 acre-feet blocks of depletions in Category 2. However, prior to depletions occurring in the second block, the Service will review the Recovery Program's progress and adequacy of the species response to the Recovery Action Plan actions. According to the criteria outlined in Appendix D, a positive response would require the adult Colorado pikeminnow population estimate to be maintained at approximately 1,100 individuals in the Colorado River (Rifle, Colorado to the confluence with the Green River), unless the criteria in Appendix D is changed because of new information. If the adult Colorado pikeminnow population is maintained at approximately 1,100 adults or whatever is determined to be the recovery goal in the Colorado River, a new population baseline would be established to determine a positive or negative population response.

When population estimates for wild adult humpback chub are finalized, they will also be used to determine population response. As outlined in Appendix D, Colorado pikeminnow and humpback chub population estimates will serve as surrogates for razorback sucker and bonytail to assess the status of their populations for 10 years. Recovery goals for all four species were completed August 1, 2002. If a population meets or exceeds the numeric goal for that species, it

will be considered to exhibit a positive response. However, short of reaching a specific recovery goal, trends in certain population indices provide an interim assessment of a species' progress toward recovery. This review will begin when actual depletion levels from the first depletion block reach 50,000 acre-feet/year or the year 2015, whichever comes first.

Calculation of actual depletions is to be accomplished using Cameo gage records and State Division of Water Resources data (Appendix B of the Colorado River PBO). The review will include a determination if all the recovery actions have been satisfactorily completed, that all ongoing recovery actions are continuing, and the status of the endangered fish species. If it is determined that the recovery actions have all been completed and the status of all four endangered fish species has improved (based on criteria in Appendix D), then the Service intends that the Colorado River PBO would remain in effect for new depletions up to 120,000 acre-feet/year (total of both 60,000 acre-feet blocks of Category 2 depletions).

Monitoring, as explained in Appendix D, will be ongoing to determine if a population estimate of 1,100 (\pm one confidence interval) adult Colorado pikeminnow is maintained. If it is not maintained, this would be considered new information and section 7 would have to be reinitiated. Population baselines will be adjusted as population estimates change. If the adult Colorado pikeminnow population estimates increase, a new population baseline will be established to determine a positive or negative population response. If the population estimate for Colorado pikeminnow in the year 2015 is greater than 1,100 adults, then the higher number will be used to establish a new population baseline. These numeric values may be revised as new information becomes available. Revisions will be made to Appendix D as needed.

If the 50,000 acre-foot or 2015 review indicates that either the recovery actions have not been completed or the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Recovery Program to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions associated with the second 60,000 acre-feet/year block. Any additional measures will be evaluated every 5 years. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required for the second 60,000 acre-feet/year, consultation on projects with a Federal nexus may be reinitiated in accordance with Endangered Species Act regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the criteria in Appendix D or if any positive response achieved prior to the 50,000 acre-foot or the year 2015 is not maintained. Once a positive response is achieved, failure to maintain it will be considered a negative response.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. The Service will reinitiate consultation with individual projects only if the Recovery Program does not implement recovery actions to improve the status of the listed fish species. The Service will reinitiate consultation first on Category 2 projects and second on Category 1 projects. The

Service will only reinitiate consultations on Category 1 depletions if Category 2 depletion impacts are offset to the full extent of the capability of the covered projects as determined by the Service and the likelihood of jeopardy to the listed fishes and/or adverse modification of critical habitat still cannot be avoided. The Service intends to reinitiate consultations simultaneously on all depletions within the applicable category.

This concludes formal consultation on the actions outlined in the February 20, 2009, request from the Corps. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the specific action(s) causing such take shall be subject to reinitiation expeditiously.

Requests for reinitiation, or questions regarding reinitiation should be directed to the Service's Colorado Field Office at the above address. If you have any questions regarding this consultation, please contact this office at (303) 236-4773.

Sincerely,



Susan C. Linner
Colorado Field Supervisor

Enclosure

cc: FWS/WTR, Denver (D. Anderson)
FWS/ES, Nebraska (J. Deweese)
FWS/ES, Grand Junction
FWS/UCREFRP, Denver
FWS/ES, Lakewood (S. Vana-Miller)

PGelatt:COEMoffatCollSystmFBO-CP101.doc072909; KM

LITERATURE CITED

Platte River Recovery Implementation Program document. 2006.

U.S. Department of the Interior. 2006. Platte River Recovery Implementation Program Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2006. Biological opinion on the Platte River Recovery Implementation Program.

Enclosure

***Recovery Agreement, Entered into
February 14, 2000 by Denver Water and USFWS***

RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this 14th day of February, 2000, by and between the United States Fish and Wildlife Service (USFWS) and the City and County of Denver, acting by and through its Board of Water Commissioners (Denver).

WHEREAS, in 1988 the Secretary of Interior, the Governors of Wyoming, Colorado and Utah, and the Administrator of the Western Area Power Administration signed a Cooperative Agreement to implement the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program); and

WHEREAS, the Recovery Program is intended to recover the endangered fish while providing for water development in the Upper Basin to proceed in compliance with state law, interstate compacts and the Endangered Species Act; and

WHEREAS, the Colorado Water Congress has passed a resolution supporting the Recovery Program; and

WHEREAS, on December 20, 1999, USFWS issued a programmatic biological opinion (1999 Opinion) concluding that implementation of specified elements of the Recovery Action Plan (Recovery Elements), along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the endangered fish or adversely modify their critical habitat in the Colorado River subbasin within Colorado, exclusive of the Gunnison River subbasin; and

WHEREAS, the 1999 Opinion in the section entitled "Reinitiation Notice" divided depletions into Category 1 or Category 2 for reinitiation purposes; and

WHEREAS, Denver is the owner and operator of water diversion projects and facilities decreed for diversion from the Fraser, Williams Fork, Blue, Eagle and Colorado Rivers and their tributaries (Water Facilities). The operation of Denver's Water Facilities includes using water stored in Williams Fork and Woford Mountain Reservoirs for substitution and in Williams Fork Reservoir for exchange purposes. Denver's Water Facilities cause or will cause depletions to the Colorado River subbasin within Colorado, exclusive of the Gunnison River subbasin; and

WHEREAS, Denver desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the Endangered Species Act (ESA); and

WHEREAS, USFWS desires a commitment from Denver to the Recovery Program so that the Program can actually be implemented to recover the endangered fish and to carry out the Recovery Elements.

NOW THEREFORE, Denver and USFWS agree as follows:

1. USFWS agrees that implementation of the Recovery Elements specified in the 1999 Opinion will avoid the likelihood of jeopardy and adverse modification under Section 7 of the ESA, for depletion impacts caused by Denver's Water Facilities. Any consultations under Section 7 regarding Denver's Water Facilities' depletions are to be governed by the provisions of the 1999 Opinion. USFWS agrees that, except as provided in the 1999 Opinion, no other measure or action shall be required or imposed on Denver's Water Facilities to comply with Section 7 or Section 9 of the ESA with regard to its Water Facilities' depletion impacts or other impacts covered by the 1999 Opinion. Denver is entitled to rely on this Agreement in making the commitment described in paragraph 2.

2. Denver agrees not to take any action which would probably prevent the implementation of the Recovery Elements. To the extent implementing the Recovery Elements requires active cooperation by Denver, Denver agrees to take reasonable actions required to implement those Recovery Elements. Denver will not be required to take any action that would violate its decrees or the statutory authorization for its Water Facilities, or any applicable limits on Denver's legal authority. Denver will not be precluded from undertaking good faith negotiations over terms and conditions applicable to implementation of the Recovery Elements.

3. If USFWS believes that Denver has violated paragraph 2 of this Recovery Agreement, USFWS shall notify both Denver and the Management Committee of the Recovery Program. Denver and the Management Committee shall have a reasonable opportunity to comment to USFWS regarding the existence of a violation and to recommend remedies, if appropriate. USFWS will consider the comments of Denver and the comments and recommendations of the Management Committee, but retains the authority to determine the existence of a violation. If USFWS reasonably determines that a violation has occurred and will not be remedied by Denver despite an opportunity to do so, the USFWS may request reinitiation of consultation on Water Facilities without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 1999 Opinion. In that event the Water Facilities' depletions would be excluded from the depletions covered by 1999 Opinion and the protection provided by the Incidental Take Statement.

4. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of Denver's Water Facilities or USFWS' statutory authority.

5. The signing of this Recovery Agreement does not constitute any admission by Denver regarding the application of the ESA to the depletions of Denver's Water Facilities. The signing of this Recovery Agreement does not constitute any agreement by either party as to whether the flow recommendations for the 15-Mile Reach described in the 1999 Opinion are biologically or hydrologically necessary to recover the endangered fish.

6. This Recovery Agreement shall be in effect until one of the following occurs:

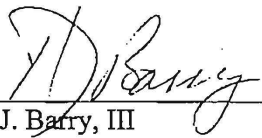
- a. USFWS removes the listed species in the Upper Colorado River Basin from the endangered or threatened species list and determines that the Recovery Elements are no longer needed to prevent the species from being relisted under the ESA; or

b. USFWS determines that the Recovery Elements are no longer needed to recover or offset the likelihood of jeopardy to the listed species in the Upper Colorado River Basin; or


c. USFWS declares that the endangered fish in the Upper Colorado River Basin are extinct; or

d. Federal legislation is passed or federal regulatory action is taken that negates the need for [or eliminates] the Recovery Program.

7. Denver may withdraw from this Recovery Agreement upon written notice to USFWS. If Denver withdraws, USFWS may request reinitiation of consultation on Water Facilities without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 1999 Opinion.


H. J. Barry, III
Manager, Denver Water

2/14/2000
Date


Ralph D. Hargrave
Regional Director, Region 6
U.S. Fish and Wildlife Service

2/14/00
Date

**REVISED
BIOLOGICAL ASSESSMENT**

**December 20, 2012 E-mail to Scott Franklin, Corps,
from Susan Linner, USFWS**

From: Linner, Susan [mailto:susan_linner@fws.gov]

Sent: Thursday, December 20, 2012 1:04 PM

To: Franklin, J Scott NWO

Cc: Parker, Andrea; Glennon, Jody; Bray, Travis J.; Carey, Timothy T NWO; Montgomery, Matthew R NWO; Sandy Vana-Miller; "Leslie Ellwood

Subject: Re: Moffat EIS Section 7 Consultation (UNCLASSIFIED)

Scott,

our plan is to provide COE with 2 separate BO's. One will contain the depletions assessment for the Platte River and the Colorado River, as well as the concurrence with NLAA for Preble's. Sandy Vana-Miller is the staff person responsible for that document, which should be completed by mid-January. Greenback cutthroat trout will be handled in a separate BO. Leslie Ellwood is the staff person preparing that document. There will likely need to be some additional discussions between Leslie, COE, and potentially the applicant before that BO can be completed. Feel free to contact either Leslie or Sandy if you need more information on the specific BOs.

Susan

--

Susan Linner, Field Supervisor
Colorado Ecological Services Office
134 Union Blvd., Suite 670
PO Box 25486 DFC
Denver, CO 80225
phone: 303-236-4774
fax: 303-236-4005

On Wed, Dec 19, 2012 at 4:40 PM, Franklin, J Scott NWO <J.Scott.Franklin@usace.army.mil> wrote:

Classification: UNCLASSIFIED

Caveats: NONE

Hi Susan -- Our office is trying to sort out the next steps on the Moffat EIS re-initiation of Section 7.

In Tim's attached letter to you dated August 14 we requested re-initiation of Section 7 regarding Greenback Cutthroat Trout, Preble's, Colorado River depletions and South Platte River depletions. Your attached response letter of Nov 20 only speaks to cutthroat trout. Resolving these four separate issues and coordination between the FWS, the Corps, Denver Water, our consultants has been somewhat confusing.

Please let me know if I should contact a separate FWS staff person (if so, which staff person) regarding each of the four issues (Greenback Cutthroat Trout, Preble's, Colorado River depletions and South Platte River depletions) or if I should arrange a call or meeting of all issues and parties together.

Thanks... -- Scott

Scott Franklin
US Army Corps of Engineers
Denver Regulatory Office
Ph: 303-979-4120
j.scott.franklin@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

**E-mail and Letter to Susan Linner, USFWS, from
Scott Franklin, Corps – August 14, 2013**

From: Franklin, J Scott NWO <J.Scott.Franklin@usace.army.mil>
Sent: Wednesday, August 14, 2013 3:38 PM
To: Susan Linner; Sandy Vana-Miller
Cc: Parker, Andrea; Glennon, Jody; Dawson, Jeffrey; Bray, Travis J.; Pete Yarrington; Brand, Rena J NWO
Subject: Moffat Project: Revised BA and Request for Formal Consultation for Depletions and Preble's (UNCLASSIFIED)
Attachments: moffat eis.ESA Re-init Corps BA depletions prebles.14-aug-2013.pdf

Classification: UNCLASSIFIED
Caveats: NONE

Hi Susan -- On August 14, 2012, Tim Carey sent you a request for re-initiation of consultation for the proposed Moffat Collection System Project. After some discussion, you indicated in an email on December 20, 2012 that the Service would provide two Biological Opinions for the Project, one addressing depletions to the Platte and Colorado Rivers and for Preble's, and the second addressing issues regarding greenback cutthroat trout.

Recently, the Corps, our Moffat Third Party Contractor URS Corporation, and Denver Water have been in informal consultation with the Service with Sandy Vana-Miller regarding the depletions and Preble's studies.

With the attached signed document we are requesting re-initiation of formal consultation for depletions to the Platte and Colorado Rivers and for Preble's. The attachment provides the following:

- a revised Biological Assessment for the depletions assessment for the Colorado River System;
- information regarding the presence of Preble's habitat along the North Fork of the South Platte River previously submitted in the Corps' August 14, 2012 letter; and
- a revised template BA for the depletions assessment for the Platte River system (refer to the August 14, 2013 letter in Attachment A).

A separate BA for greenback cutthroat trout will be provided in the future after further informal consultation with Leslie and your office.

I have also copied this document to Pete Yarrington of FERC for his review of Denver Water's FERC re-licensing of Gross Reservoir.

Please let me know if you have questions or concerns, or need me to send the original hard copy. Thanks again... --
Scott

Scott Franklin, Moffat EIS Project Manager

US Army Corps of Engineers
Denver Regulatory Office
9307 South Wadsworth Blvd
Littleton, CO 80128
Ph: 303-979-4120
j.scott.franklin@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
DENVER REGULATORY OFFICE, 9307 SOUTH WADSWORTH BLVD
LITTLETON, CO 80128-6901



August 14, 2013

Susan Linner
U.S. Fish and Wildlife Service
Ecological Services
Colorado Field Office
P.O. Box 25486, DFC (MS 65412)
Denver, CO 80225-0486

RE: Revised Biological Assessment and Request for Formal Consultation for Moffat Collection System Project; Corps File NWO-2002-80762-DEN

Dear Ms. Linner:

On August 14, 2012, Tim Carey of the U.S. Army Corps of Engineers (Corps) sent you a request for re-initiation of consultation for the proposed Moffat Collection System Project (Moffat Project or Project). During subsequent discussions, you sent an email to Scott Franklin of the Corps on December 20, 2012, indicating that the USFWS would provide two Biological Opinions (BOs) for the Project, one addressing depletions to the Platte and Colorado rivers and Preble's meadow jumping mouse (Preble's) (*Zapus hudsonius preblei*), and the second addressing greenback cutthroat trout (*Onchorhynchus clarki stomias*).

This letter provides the following:

- a revised Biological Assessment (BA) for the depletions assessment for the Colorado River System;
- information regarding the presence of Preble's habitat along the North Fork of the South Platte River previously submitted in the Corps' August 14, 2012 letter; and
- a revised template BA for the depletions assessment for the Platte River system (refer to the August 14, 2013 letter in Attachment A).

A separate BA for greenback cutthroat trout will be provided in the future after further discussions.

Project Description

The Corps is preparing an Environmental Impact Statement (EIS) and will review the application for a Clean Water Act Section 404 Individual Permit for the proposed Moffat Project, which involves the expansion of Gross Reservoir in Boulder County, Colorado, and increased stream diversions in the Colorado River and Platte River systems. The Applicant is the City and County of

Denver, acting by and through its Board of Water Commissioners (Denver Water), and the expansion of Gross Reservoir is Denver Water's preferred alternative. The Corps previously requested initiation of formal consultation under Section 7(a) of the Endangered Species Act for this Project on February 20, 2009. The USFWS issued a final BO on July 31, 2009. Re-initiation of consultation was requested by the Corps on August 14, 2012, in response to a February 16, 2010, letter from the U.S. Department of the Interior, Office of Environmental Policy and Compliance, that included comments on the Draft EIS.

The BO issued for the Moffat Project on July 31, 2009, only addressed additional future depletions associated with the Moffat Project. This revised BA provides comprehensive information regarding all of Denver Water's past, existing, and future diversions and depletions to the Colorado River and Platte River system. Denver Water met with Sandy Vana-Miller and Tom Econopouly in September 2011 to discuss hydrological information and assumptions used to calculate diversions and depletions. A memo was prepared as a result of those discussions, was revised during subsequent discussions, and is included as Attachment B. It provides a description of all diversions and depletions from the Colorado River per the 15-mile Reach Programmatic Biological Opinion (PBO) (USFWS 1999) for the Upper Colorado River Recovery Program, as well as similar information for the South Platte River as related to the Platte River Recovery Implementation Program (PRRIP) and June 16, 2006 PBO.

Comments from the U.S. Forest Service (USFS) on the Draft EIS indicated that an additional population of Preble's had been found along the North Fork of the South Platte River. The 2009 BA did not address impacts to this species from flow changes in the North Fork of the South Platte River. A supplemental assessment is provided in this letter. The Corps has determined that Project activities are not likely to adversely affect Preble's habitat along the North Fork of the South Platte River. This is the same determination that was previously made for impacts to this species in other portions of the Project area that would have stream flow changes.

Colorado River Depletions

The 2009 BO recognized that the "Moffat Project will deplete an additional 15,121 acre-feet (AF) of water from the Upper Colorado River Basin" (USFWS 2009, page 9). Based on more comprehensive information developed by Denver Water (Attachment B), Denver Water's modeled depletion from the Upper Colorado River Basin has increased by 2,255 acre-feet per year (AF/yr), to a total of 17,376 AF/yr for this consultation. Once the Moffat Project is complete, Denver Water's total average annual depletions to the Colorado River would be 188,497 AF at an average annual demand of 363,000 AF. The Colorado River System depletions include 137,833 AF of average annual depletions that occurred before the initiation of the Upper Colorado River Recovery Program and previous consultations of 33,288 AF/yr. The total of 188,497 AF therefore includes 17,376 AF of new depletions and 171,121 AF ($137,833 + 33,288$) of historic depletions that have already been consulted on.

The proposed Moffat Project and Denver Water's full use of its existing system would result in additional water depletions from the Upper Colorado River Basin of 17,376 AF/yr, including 15,121 AF/yr of diversions for the Moffat Project and an additional 2,255 AF/yr resulting from full use of Denver Water's existing system that have not been previously included in USFWS consultations. Average annual diversions due to the proposed Project would increase by 10,285 AF/yr through the Moffat Tunnel, which includes water diverted from the Fraser River and from the Williams Fork

River via the Gumlick Tunnel. The proposed Moffat Project would also divert an additional 4,836 AF/yr through the Roberts Tunnel, which diverts water from the Blue River. Increased diversions would decrease flows in the Colorado River primarily during the summer months, especially June and July.

Listed Species Associated with the Upper Colorado River

Water depletions to the Colorado River and its tributaries have the potential to affect four endangered fish species, including bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*). The decline of these fish species throughout the Colorado River Basin is a result of extensive loss, fragmentation, and modification of habitat, barriers to fish movement resulting from dam construction and operations, and competition and predation by non-native fish. Depletions may adversely affect these species by reducing peak and base flows that may limit access to and the extent of off-channel waters such as backwaters, eddies, and oxbows, which are necessary as rearing areas for young. Depletions of any amount are considered by USFWS to be an adverse effect. Critical habitat for these species was designated in 1994 and includes reaches of the Colorado River in Mesa County downstream of the Moffat Project area (USFWS 1994). Recovery actions are addressed in the Upper Colorado River Endangered Species Recovery Program (USFWS 2013). Additional biological information for these species is provided in the 2009 BA (Corps 2009).

Denver Water Facilities in the Colorado River Basin

To meet the noted average annual demand (363,000 AF), Denver Water will use its entire Colorado River Collection System and associated water rights. The majority of Denver Water's Colorado River supplies are diverted to the Front Range from the Blue River via the Roberts Tunnel and from the Fraser River and Williams Fork River basins via the Moffat Tunnel. All of the water diverted from the West Slope is fully depleted from the Colorado River Basin and there are no return flows.

Denver Water has the following water facilities within the Colorado River Basin:

- Reservoirs: Dillon, Williams Fork, Wolford Mountain (Denver Water's portion), and Meadow Creek
- Tunnels: Roberts, Moffat, Vasquez, and Gumlick
- Ditches/canals associated with water diversions for the Gumlick Tunnel and Moffat Tunnel
- Diversion structures on the Fraser River and tributaries of the Fraser River and Williams Fork River

Summary of Past Consultations

The 15-mile Reach PBO was issued in December 1999. The PBO defines existing depletions as those occurring on or before September 30, 1995. Denver Water's existing, average annual diversions for its 1995 demand level were estimated as 59,154 AF/yr for the Roberts Tunnel and 58,389 AF/yr for the Moffat Tunnel (Appendix F of the 1999 PBO), for a total of 117,543 AF/yr.

Since the PBO, USFWS consulted on Denver Water's Colorado River depletions on three occasions. Excluding the most recent consultation for the Moffat Project in 2009, a total of 33,288

AF/yr has been addressed (5,813 AF/yr for Gross Reservoir in 2000 and 27,475 AF/yr for Williams Fork Reservoir in 2006), as described below.

Gross Reservoir was previously consulted on by the Federal Energy Regulatory Commission (FERC) and USFWS between 1997 and 2000. The USFWS issued a BO to FERC on October 12, 2000, for 5,813 AF/yr of new depletions to the Colorado River. This amount was calculated as the increase in Moffat Tunnel diversions (including depletions caused by the Gumlick Tunnel) from the then-current average annual demand of 265,000 AF and the full use of the existing system average annual demand of 345,000 AF.

Williams Fork Reservoir was previously consulted on by FERC and USFWS in 2006. The Williams Fork Reservoir, Dam, and Powerplant were relicensed by FERC in 2006 because the original FERC license was set to expire. The relicensing did not allow for new depletions, but did specify the total depletions the operations of Williams Fork Reservoir would cause to the Colorado River associated with a demand of 345,000 AF/yr. These depletions were specific to the operation of Williams Fork Reservoir resulting from exchanges to Dillon Reservoir, Roberts Tunnel, Henderson Mill, Moffat Tunnel (including depletions caused by the Gumlick Tunnel), reservoir evaporation, and substitution for Green Mountain Reservoir. The USFWS issued a BO to FERC on July 6, 2006, acknowledging 27,475 AF/yr of historic depletions to the Colorado River (see Table 1 below).

Consultation for the Moffat Project was completed by the Corps and USFWS in July of 2009, for an additional 15,121 AF/yr depletion from the Colorado River. Although Moffat Project impacts have not changed since the 2009 BO, an additional 2,255 AF/yr of depletions have been identified that have not been previously addressed in consultation. It is the Corps' understanding that the USFWS will issue a new BO for Colorado River depletions based on information presented in this revised BA, which will replace or supersede the 2009 BO.

Summary of Denver Water's Colorado River Depletions

Tables 1 through 3 provide a summary of depletions to the Colorado River resulting from Denver Water's entire system, using four different water demand levels:

- Baseline Condition (Base265) – This represents Denver Water's depletions in the mid-to-late 1990s based on an average annual demand of 265,000 AF/yr.
- Current Condition (Base285) – This represents depletions associated with current operation of Denver Water's existing system based on an average annual demand of 285,000 AF/yr.
- Full Use of Existing System (Base345) – This represents future depletions with full use of the existing system based on an average annual demand of 345,000 AF/yr.
- Proposed Action (Base363) – This represents future depletions with full use of the existing system plus the Moffat Project (Proposed Action) based on an average annual demand of 363,000 AF/yr (i.e., $345,000 + 18,000 = 363,000$ AF/yr).

The Base265 information relies on information from the Gross Reservoir FERC relicensing effort and model simulation that were developed in 1996-1997. The Base 285, 345, and 363 information is from the Moffat Project EIS using Platte and Colorado Simulation Model simulations completed in February 2007.

Tables 1, 2, and 3 show Denver Water's diversions and depletions from the Colorado River, reservoir evaporation, and total depletions, associated with four levels of increasing demand. As Denver Water's demand continues to increase, depletions from the Colorado River will also increase. While diversions and total depletions will increase, there will be less evaporative loss from reservoirs because of lower reservoir contents.

Table 1
Denver Water's Average Annual Depletions from the Colorado River
at Four Demand Levels

Source of Depletion	Demand Level (acre-feet per year)			
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Total Roberts Tunnel Diversions	66,436	69,676	96,939	101,775
Change from Previous Demand Level		+3,240	+27,263	+4,836
Change from Baseline		+3,240	+30,503	+35,339
Moffat Tunnel Diversions	60,593	63,799	66,512	76,797
Change from Previous Demand Level		+3,206	+2,713	+10,285
Change from Baseline		+3,206	+5,919	+16,204
Total Colorado River Diversions	127,029	133,475	163,451	178,572
Change from Previous Demand Level		+6,446	+29,976	+15,121
Change from Baseline		+6,446	+36,422	+51,543

Note:
Refer to Table 2 in Attachment B.

Table 2
Average Annual Evaporation from Denver Water's West Slope Reservoirs
at Four Demand Levels

Reservoir	Demand Level (acre-feet per year)			
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Dillon Reservoir	5,935	5,847	5,494	5,368
Williams Fork Reservoir	3,660	3,227	3,355	3,331
Meadow Creek Reservoir	169	202	201	199
Wolford Mountain Reservoir (Denver Water portion) ¹	1,040	1,083	1,031	1,027
Total Evaporation	10,804	10,359	10,081	9,925

Notes:

Refer to Table 4 in Attachment B.

¹Although the Colorado River Water Conservation District is responsible for all evaporation at Wolford Mountain Reservoir, the value shown is the proportionate amount of evaporation due to Denver Water's share of the reservoir.

Table 3
Summary of Denver Water's Average Annual Depletions from the Colorado River
at Four Demand Levels

Source of Depletion	Demand Level (acre-feet per year)			
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Colorado River Diversions	127,029	133,475	163,451	178,572
Change from Previous Demand Level		+6,446	+29,976	+15,121
Change from Baseline		+6,446	+36,422	+51,545
Reservoir Evaporation	10,804	10,359	10,081	9,925
Change from Previous Demand Level		-445	-278	-156
Change from Baseline		-445	-723	-879
Total Depletions	137,833	143,834	173,532	188,497
Change from Previous Demand Level		+11,001	+24,698	+14,965
Change from Baseline		+11,001	+35,699	+50,664

Note:

Refer to Table 5 in Attachment B.

The Upper Colorado River Recovery Program defines existing depletions as those occurring on or before September 30, 1995. At that time, Denver Water's average annual demand was 265,000 AF and an annual average of 127,029 AF of water was diverted from the Colorado River to the East Slope to meet this demand. Together with 10,804 AF/yr of reservoir evaporation, this resulted in a total depletion of 137,833 AF/yr. Denver Water's proposed Moffat Project would allow Denver Water to meet an average annual demand of 363,000 AF/yr, which would involve diversion of an average of 178,572 AF/yr from the Colorado River and a total depletion of 188,487 AF/yr (Table 3). This would be a total increase (Base265 to Base363) of 51,543 AF/yr (178,572 – 127,029) in diversions and 50,664 AF/yr (188,497-137,833) in depletions.

As discussed earlier, prior consultations have addressed a total of 33,288 AF/yr of depletions. Thus, Denver Water's total "new" depletion from the Colorado River for this consultation is 17,376 AF/yr (50,664 – 33,288). As previously discussed, the new depletion includes 15,121 AF/yr for the Moffat Project and 2,255 AF/yr resulting from full use of Denver Water's existing system. The "historic" depletion that has already been addressed in the PBO or in subsequent consultation is 171,121 AF/yr (137,833 for Base265 + 33,288).

Effect Determination and Conservation Measures

The Moffat Project is likely to adversely affect Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub, and their critical habitat.

The Colorado River PBO addressed all existing depletions and 120,000 AF/yr of new depletions for the Colorado River Basin above the confluence with the Gunnison River. Denver Water signed a Recovery Agreement with the USFWS in 2000, for the consultation with FERC for relicense of the Gross Reservoir Hydroelectric Project. The USFWS informed the Corps at a meeting in January 2008 that proposed Moffat Project depletions to the Colorado River would be covered under Denver Water's Recovery Agreement. Under the Recovery Program, new depletions of over 100 AF require a one-time payment that is calculated based on the amount of depletion and the share of the Recovery Program's costs in effect at the time payment is made. Compliance with all the terms and conditions in the BO would be included by the Corps as a Section 404 Permit special condition.

Preble's Meadow Jumping Mouse

The 2009 BA evaluated impacts to Preble's from construction and operation of the Moffat Project. Supplemental information is provided here regarding the presence of Preble's habitat along the North Fork of the South Platte River and potential impacts from the Moffat Project. This is the same information provided in the Corps' letter to the USFWS dated August 14, 2012.

Occurrence in Impact Area

The 2009 BA stated that the portion of the North Fork of the South Platte River within Jefferson County is considered within the overall range of Preble's, but that they have only been found at one location along the North Fork, and on a tributary, Kennedy Gulch. In its comments on the Draft EIS (USFS 2010), the USFS indicated that Preble's had also been found at Pine Valley Ranch in western Jefferson County, as reported by Ensign Technical Services (2000). Because this population occurs along a portion of the North Fork of the South Platte River in the Project area, a supplemental analysis of stream flow changes was prepared.

Effects of Proposed Action

Changes in flow in the North Fork of the South Platte River may affect, but are unlikely to adversely affect Preble's occupied habitat. Changes in flow would occur because of the shift in seasonal operations between Denver Water's northern and southern water treatment plants. Deliveries through the Roberts Tunnel would be lower in winter and higher in summer. Average annual flow would increase by 3 percent, as shown in Table H-3.41 in Attachment C. Average monthly flows would decrease during the winter months of November to March by 25 to 30 percent, and would increase by 6 to 29 percent during the months of May through September. Dry year annual flows would increase by about 1 percent, and wet year annual flows would decrease by about 2 percent. Changes in winter flows would generally be similar (as a percent) in average, dry, and wet years. Increases in summer flows would be less and for shorter periods during dry and wet years than during average years. Because flows would increase during the growing season, changes in flows are unlikely to adversely affect Preble's habitat. Reductions in flow during the winter months are unlikely to affect the availability or use of hibernacula.

Effect Determination

The Proposed Action may affect, but is not likely to adversely affect Preble's along the North Fork of the South Platte River. This is the same effect determination that was made in the 2009 BA and BO for effects to Preble's from changes in flows in South Boulder Creek, the South Platte River between Cheesman Reservoir and Strontia Springs Reservoir, and the South Platte River between Waterton Canyon and Chatfield Reservoir.

Conclusion

The Corps has concluded that operation of the proposed Project is likely to adversely affect the four endangered Colorado River fish species and their critical habitat. The Project fits under the umbrella of the Colorado River PBO; the Applicant has already signed a Recovery Agreement and the Corps will require payment of the one-time fee for new depletions as a Section 404 Permit condition. Operation of the Moffat Project is not likely to adversely affect Preble's along the North Fork of the South Platte River.

Impacts to federally-listed species in Nebraska are described in the August 14, 2013 BA and will be addressed under the PRRIP. A separate BA for greenback cutthroat trout will be provided in the future.

The Corps is requesting re-initiation of formal consultation under Section 7(a) of the Endangered Species Act. Please contact me at 303-979-4120 or Jeff Dawson of URS at 303-740-2793 if you have any questions regarding this matter.

Sincerely,

A handwritten signature in black ink that reads "J. Scott Franklin". The signature is written in a cursive style with a large, stylized "J" and "F".

Scott Franklin
Moffat Collection System Project EIS Manager

cc: Pete Yarrington, FERC

Attachments:

- A. Biological Assessment and Request for Re-Initiation of Formal Section 7 Consultation for the Moffat Collection System Project – Federally-listed Species in Nebraska, August 14, 2013
- B. Memorandum from Denver Water to the Corps, Revised August 1, 2013
- C. Hydrology Table H-3.41 from the Moffat Collection System Project Final EIS

Literature Cited

- Ensign Technical Services. 2000. Presence or Absence Survey for Preble's Meadow Jumping Mouse at Pine Valley Ranch, Jefferson County, Colorado. Ensign Technical Services, Longmont, Colorado. Submitted to Denver Water, Denver, Colorado.
- U.S. Army Corps of Engineers, Omaha District (Corps). 2009. Moffat Collection System Project Biological Assessment. Submitted to U.S. Fish and Wildlife Service, Colorado Field Office. February 20.
- U.S. Department of the Interior, Office of Environmental Policy and Compliance. 2010. Letter from Robert F. Stewart, Regional Environmental Officer, to Scott Franklin, Moffat EIS Project Manager, U.S. Army Corps of Engineers, Regarding Review and Comments on the Moffat Collection System Project Draft Environmental Impact Statement. February 16.
- U.S. Fish and Wildlife Service (USFWS). 1994. Determination of Critical Habitat for the Colorado River Endangered Fishes: Razorback Sucker, Colorado Squawfish, Humpback Chub, and Bonytail Chub. Federal Register 59(54):13374-13400.
- _____. 1999. Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River Above the Confluence with the Gunnison River.
- _____. 2009. Final Programmatic Biological Opinion for the Moffat Collection System Project, U.S. Army Corps of Engineers Permit Application Number NWO-2002-80762-DEN on Federally-listed Species and Designated Critical Habitat. July 31.
- _____. 2013. Upper Colorado River Endangered Fish Recovery Program Website. <http://www.coloradoriverrecovery.org/>.
- U.S. Forest Service (USFS). 2010. Letter from Glenn Casamassa, Forest Supervisor, to Scott Franklin, U.S. Army Corps of Engineers Regarding USFS' Comments on Moffat Draft Environmental Impact Statement. Arapaho and Roosevelt National Forests and Pawnee National Grassland. March 16.

Attachment A

***Biological Assessment and Request for
Re-Initiation of Formal Consultation for Moffat
Collection System Project – Federally-listed
Species in Nebraska
August 14, 2013***

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
DENVER REGULATORY OFFICE, 9307 SOUTH WADSWORTH BLVD
LITTLETON, CO 80128-6901



**BIOLOGICAL ASSESSMENT
REQUEST FOR FORMAL SECTION 7 CONSULTATION
Federally-Listed Species in Nebraska**

August 14, 2013

Susan Linner
U.S. Fish and Wildlife Service
Ecological Services
Colorado Field Office
P.O. Box 25486, DFC (MS 65412)
Denver, Colorado 80225-0486

**Re: Request for Re-Initiation of Formal Consultation for Moffat Collection System Project
Corps File NWO-2002-80762-DEN**

Dear Ms. Linner:

This letter contains the revised Biological Assessment (BA) addressing potential impacts from operation of the proposed Moffat Collection System Project (Moffat Project or Project) for the expansion of Gross Reservoir in Boulder County, Colorado, on federally-listed species in Nebraska. With this submission, we are requesting re-initiation of Formal Consultation under Section 7(a) of the Endangered Species Act of 1973, as amended (16 United States Code 1531 et seq.) ("ESA"), concerning the whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), northern Great Plains population of the piping plover (*Charadrius melodus*), pallid sturgeon (*Scaphirhynchus albus*) (collectively referred to as the "target species"), and designated critical habitat of the whooping crane. We further request re-initiation of Formal Consultation for the western prairie fringed orchid (*Platanthera praeclara*). We have determined that the Project is not likely to adversely affect the American burying beetle (*Nicrophorus americanus*) and will have no effect on the Eskimo curlew (*Numenius borealis*).

Project Description

The U.S. Army Corps of Engineers (Corps) is preparing an Environmental Impact Statement and will review the application for a Section 404 Permit for the proposed Moffat Project, which includes expansion of Gross Reservoir in Boulder County, and increased stream diversions in Summit, Grand, Park, Douglas, and Boulder counties. The Applicant is the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water), and the expansion of Gross Reservoir is Denver Water's preferred alternative.

The Corps previously requested initiation of formal consultation under Section 7(a) of the ESA for this Project on February 20, 2009. The U.S. Fish and Wildlife Service (USFWS) issued a final Biological Opinion (BO) on July 31, 2009. The BO only addressed additional future depletions

associated with the Moffat Project. This revised BA provides comprehensive information regarding all of Denver Water's past, existing, and future diversions to the Platte River system.

Denver Water proposes to enlarge its existing 41,811 acre-foot (AF) Gross Dam by 72,000 AF to a total storage capacity of 113,811 AF. This would be accomplished by raising the existing concrete gravity arch dam by 125 feet, from 340 to 465 feet high. Denver Water is also proposing to create an additional 5,000 AF of storage in Gross Reservoir, as mitigation, to enhance aquatic habitat in South Boulder Creek downstream of the reservoir. This additional storage would be filled with water provided by the cities of Boulder and Lafayette, and released for environmental flows. None of Denver Water's existing or future water supply would be stored in this 5,000-AF environmental pool. Denver Water is proposing to raise the dam an additional 6 feet, beyond the proposed 125-foot raise, to a total dam height of 131 feet.

Using existing collection infrastructure, water from the Fraser River, Williams Fork River and South Boulder Creek would be diverted and delivered during average to wet years via the Moffat Tunnel and South Boulder Creek to Gross Reservoir. In order to firm this water supply and provide 18,000 acre-feet per year (AF/yr) of new firm yield, an additional 72,000 AF of storage capacity is necessary. Existing facilities, including the South Boulder Diversion Canal and Conduits 16/22, would be used to deliver water from the enlarged Gross Reservoir to the Moffat Water Treatment Plant (WT Plant) and raw water customers. To meet future demands, in most years, Denver Water would continue to rely on supplies from its entire integrated collections system. In a drought or emergency, Denver Water would rely on the additional water it would have previously stored in the Moffat Collection System to provide the additional 18,000 AF of yield.

The purpose of the Moffat Project is to develop 18,000 AF/yr of new, annual firm yield to the Moffat WT Plant and raw water customers upstream of the Moffat WT Plant pursuant to the Board of Water Commissioners' commitment to its customers. Denver Water's need for the proposed Moffat Project is to address two major issues: (1) timeliness - the overall near-term water supply shortage, and (2) location - the imbalance in water storage and supply between the North and South systems.

Applicant

Travis Bray
Denver Water
1600 West 12th Avenue
Denver, CO 80204-3412
303-628-6551

Project Location

Gross Dam is located approximately 35 miles northwest of Denver and 6 miles southwest of the City of Boulder, in Section 21, T1S, R71W in Boulder County, Colorado.

Federal Action

The federal action triggering Section 7 Consultation is potential impacts to Gross Reservoir from the enlargement of Gross Dam. Gross Reservoir and South Boulder Creek are jurisdictional waters of the United States under Section 404 of the Clean Water Act, and a Section 404 Individual Permit is required to impact these jurisdictional waters.

Depletions

Operation of this Project would result in some amount of continuing historic and/or new depletions from the South Platte River associated with the operation of Denver Water's collection system. Under the Proposed Action, Denver Water would increase diversions from the South Platte River. On February 20, 2009, the Corps submitted a request to the USFWS for Section 7 consultation using the template BA. The average annual *depletions* to the South Platte River associated with the proposed Moffat Project were estimated to be 1,607 AF/yr. Denver Water is a member of the South Platte Water Related Activities Program (SPWRAP), which covers depletions caused by members participating in the Platte River Recovery Implementation Program (PRRIP).

Denver Water is providing the following revised descriptive information as requested by the USFWS for Section 7 consultation.

- Location of water use – Denver Water's South Platte collection system, including reservoirs, is located throughout the South Platte River watershed (Table 1).
- Use of water – The water is decreed for municipal and industrial purposes through multiple water right decrees.
- Sources of water – The majority of Denver Water's South Platte River supplies are diverted from the river at Strontia Springs Reservoir or downstream at Conduit 20 intake in Waterton Canyon. Some water is also diverted from facilities on Bear Creek, South Boulder Creek, Ralston Creek, and Cherry Creek.
- Quantities of water – The total South Platte River diversions, including reservoir evaporative losses, associated with Denver Water's past, existing and future demand levels since implementation of the PRRIP is 48,767 AF/yr. The total average annual diversions caused by the proposed Moffat Project would be 3,460 AF/yr (Table 3).

Table 1 Denver Water's Facilities in the South Platte River Watershed	
<i>Reservoirs</i>	Antero, Eleven Mile, Cheesman, Strontia Springs, Chatfield (Denver Water's portion), Gross, Ralston, Upper and Lower Long Lakes, Upper and Lower Soda Lakes, Harriman, Platte Canyon, wells, and South Platte Gravel Pit storage
<i>Conduits</i>	16, 20, 22, and 26
<i>Ditches/Canals</i>	High Line, South Boulder, Long Lakes, Harriman (Denver Water's portion), Old Last Chance, and water rights where the consumptive use has been transferred to municipal purposes ¹
<i>Pumps</i>	Chatfield and Kassler

¹ Denver Water has changed a number of water rights from the decreed purpose to municipal use. These water rights had specific points of diversion (such as Nevada Ditch), but the point of diversion was changed to one of Denver Water's other diversion points (such as Conduit 20 inlet or Strontia Springs). The change in diversion point allows Denver Water to divert the consumptive use portion of these water rights into its raw water collection system.

Reservoir Evaporation

The average annual net reservoir evaporation from Denver Water’s east slope reservoirs is shown in Table 2.

Table 2 Average Annual Evaporation at Denver Water East Slope Reservoirs (acre-feet/year)				
	Baseline (Base265)	Current/Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
South Platte River Basin				
Antero Reservoir	3,430	3,671	3,625	3,602
Eleven Mile Reservoir	6,091	5,950	5,838	5,856
Cheesman Reservoir	1,125	1,081	1,074	1,058
Strontia Springs (all)	114	142	136	132
Marston Reservoir	1,326	1,354	1,350	1,346
Chatfield Reservoir	2,909	2,946	2,982	2,974
Reuse Reservoir ²	n/a	319	428	449
Exchange Reservoir	n/a	418	1,240	1,320
Gross Reservoir ³	468	452	477	991
Ralston Reservoir	279	321	321	324
Remaining (estimated) ⁴	400	400	400	400
Total South Platte River	16,142	17,054	17,871	18,452

Summary of Diversions to the South Platte River for this Consultation

Table 3 summarizes the total average annual diversions that are used to meet customer demand and reservoir evaporation. As shown in Table 3, the proposed Moffat Project would result in additional average annual diversions of 3,460 AF/yr from the South Platte River (202,880 – 199,420). This includes 2,879 AF/yr of new diversions and 581 AF/yr of additional reservoir operation. Overall, average annual diversions from the South Platte River since implementation of the PRRIP is 48,767 AF/yr (202,880 – 154,113).

² The combined capacity of the Reuse Reservoir and the Exchange Reservoir is 13,500 AF/yr in Base285, and 30,000 AF/yr in Base345 and Base363. The annual water demand for the recycling project is 7,000 AF in Base285, and 17,500 AF in Base345 and Base363. These are also known as “South Platte Gravel Pits.”

³ Gross Reservoir capacity is 41,811 AF in Base265, Base285, and Base345, and 113,811 AF in Base363.

⁴ The remaining reservoirs include Harriman Reservoir, Upper and Lower Soda Lakes, Upper and Lower Long Lakes, and Platte Canyon Reservoir, with a total capacity of approximately 4,140 AF. Average annual evaporation from these reservoirs is estimated to be about 400 AF.

Table 3 Summary of Denver Water's Total South Platte River Average Annual Diversions (acre-feet/year)					
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)	Change from Full Use to Proposed Action
South Platte River Diversions	137,971	151,525	181,549	184,428	+2,879
Reservoir Evaporation	+16,142	+17,054	+17,871	+18,452	+581
Total South Platte Diversions	154,113	168,579	199,420	202,880	+3,460

The PRRIP, established in 2006, is implementing actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Colorado, Nebraska, and Wyoming and the U.S. Department of the Interior [Program, I.A.1]. The Program addresses the adverse impacts of existing and certain new water related activities on the Platte target species and associated habitats, and provides ESA compliance⁵ for effects to the target species and whooping crane critical habitat from such activities including avoidance of any prohibited take of such species [Program, I.A.2 and footnote 2.]. The State of Colorado is in compliance with its obligations under the Program.

For Federal actions and projects participating in the Program, the PRRIP Final Environmental Impact Statement and the June 16, 2006 Programmatic Biological Opinion (PBO) serve as the description of the environmental baseline and environmental consequences for the effects of the Federal actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO. These documents are hereby incorporated into this BA by this reference.

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service's determination of the effects of the Federal action analyzed in the PBO. The Service determined in the PBO that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the continued existence of the endangered whooping crane, interior least tern, and pallid sturgeon, or the threatened northern Great Plains population of the piping plover. Further, the Service found that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the threatened bald eagle and western prairie fringed orchid associated with the central and lower reaches of the Platte River in Nebraska, and was not likely to destroy or adversely modify designated critical habitat for the whooping crane. The bald eagle was subsequently removed from the federal endangered species list on August 8, 2007.

⁵ "ESA Compliance" means: (1) serving as the reasonable and prudent alternative to offset the effects of water-related activities that FWS found were likely to cause jeopardy to one or more of the target species or to adversely modify critical habitat before the Program was in place; (2) providing offsetting measures to avoid the likelihood of jeopardy to one or more of the target species or adverse modification of critical habitat in the Platte River basin for new or existing water-related activities evaluated under the ESA after the Program was in place; and (3) avoiding any prohibited take of target species in the Platte River basin.

The Service also determined that the PBO Federal Action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered American burying beetle.

The above-described Project operations qualify as a “new water related activity” because such operations constitute a new surface water or hydrologically connected groundwater activity which may affect the quantity or timing of water reaching the associated habitats of the target species implemented after July 1, 1997 [Program, I.A footnote 3]. The Project conforms to the following criteria in Section H of Colorado’s Plan for Future Depletions [Program, Attachment 5, Section 9]:

1. The Project is operated on behalf of Colorado water users;
2. The Project does not involve construction of a major on-stream reservoir located on the mainstem of the South Platte River anywhere downstream of Denver, Colorado;
3. The Project is not a hydropower diversion/return project diverting water including sediments from the mainstem of the South Platte River anywhere downstream of Denver and returning clear water to the South Platte River.
4. The Project does not cause the average annual water supply to serve Colorado’s population increase from “Wastewater Exchange/Reuse” and “Native South Platte Flows” to exceed 98,010 AF during the February-July period.

Accordingly, the impacts of this activity to the target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO are covered and offset by operation of Colorado’s Future Depletions Plan as part of the PRRIP.

The Applicant intends to rely on the provisions of the Program to provide ESA compliance for potential impacts to the target species and whooping crane critical habitat. The Corps intends to require, as a condition of any approval, that the Applicant fulfill the responsibilities required of Program participants in Colorado, which includes participation in the SPWRAP. The Applicant, Denver Water, is a member of SPWRAP. The Corps also intends to retain discretionary Federal authority for the Project, consistent with applicable regulations and Program provisions, in case reinitiation of Section 7 consultation is required.

This letter addresses consultation on all listed species and designated critical habitat, including the referenced Platte River target species and whooping crane critical habitat. Potential impacts from construction and operation of the Project to any other federally-listed threatened or endangered species and designated critical habitats will be addressed within the applicable BO prepared by the Service, in accordance with the ESA.

Sincerely

A handwritten signature in black ink that reads "J. Scott Franklin". The signature is fluid and cursive, with the first name "J." and last name "Franklin" clearly legible.

Scott Franklin
Moffat Collection System Project EIS Manager

cc: Peter Yarrington, FERC

Attachment B

***Memorandum from Denver Water to the Corps,
Revised August 1, 2013***

MEMORANDUM

TO: SCOTT FRANKLIN, U.S. ARMY CORPS OF ENGINEERS

FROM: TRAVIS BRAY, DENVER WATER

SUBJECT: MOFFAT COLLECTION SYSTEM PROJECT EIS
SOUTH PLATTE AND COLORADO RIVERS SECTION 7 CONSULTATION DEPLETIONS AND
DIVERSIONS

DATE: MAY 23, 2012; REVISED MARCH 20, 2013; REVISED MAY 1, 2013;
REVISED AUGUST 1, 2013

On May 12, 2008, Denver Water provided information to the U.S. Army Corps of Engineers (Corps) concerning Denver Water's past, existing and future diversions and depletions to the Colorado and South Platte rivers that would result from Denver Water meeting new demands using existing infrastructure and operation of the Moffat Collection System Project (Moffat Project). This information was used by the Corps in their Biological Assessment (BA) and consultation with the U.S. Fish and Wildlife Service (USFWS). (A copy of the letter can be found in Appendix C of the BA dated June 2009.) Since the Corps will be reinitiating consultation with the USFWS for the proposed Moffat Project, Denver Water requests that the Corps use the following updated hydrologic information for its consultation with the USFWS. This memorandum replaces the May 12, 2008 letter from Denver Water in the 2009 BA.

Denver Water met with Sandy Vana-Miller and Tom Econopouly of the USFWS and Matt Montgomery of the Corps on September 2, 2011 to discuss Denver Water's past, existing and future diversions and depletions. Denver Water explained the hydrological information and the various assumptions used to calculate the diversions and depletions. It is our understanding that both the Corps and USFWS agreed that the analysis would meet the needs for their agency regarding Section 7 consultation. The updates to the hydrologic information include the following:

- A description of all diversions and depletions (past, existing and future) from the Colorado River per the 15-mile Reach Programmatic Biological Opinion (PBO) for the Upper Colorado River Recovery Program.
- A description of all diversions and depletions (past, existing and future) from the South Platte River per the PBO for the Platte River Recovery Implementation Program (PRRIP).

The diversions are calculated using Denver Water's Platte and Colorado Simulation Model (PACSM). PACSM was verified by the Corps as part of the Environmental Impact Statement (EIS) process.¹

¹ PACSM was verified by the U.S. Army Corps of Engineers in the Moffat EIS process. Refer to the technical memoranda, *Summary of Phase I-Task 3, Moffat Collection System Project EIS* (Boyle 2003), *Review of PACSM Modifications* (Boyle 2004), *Review of Lower South Platte River Extension in PACSM* (Boyle 2006a), and *Review of Modifications Made to PACSM to Reflect the Baseline Scenario and EIS Alternatives* (Boyle 2006b).

Colorado River Diversions and Depletions

Denver Water diverts Colorado River basin water through the Roberts and Moffat tunnels directly to the East Slope. The Gumlick Tunnel conveys water to the East Slope to the Vasquez Tunnel, which conveys water back to the West Slope and into the Moffat Collection System. All the Gumlick Tunnel diversions are included in the Moffat Tunnel values. Therefore, all of the water diverted from the West Slope is fully depleted from the Colorado River basin and there are no return flows.

The 15-mile Reach PBO was issued in December 1999. The PBO defines existing depletions as those occurring on or before September 30, 1995. Denver Water's existing, average annual diversions for its 1995 demand level were estimated as 59,154 acre-feet per year (AF/yr) for the Roberts Tunnel and 58,389 AF/yr for the Moffat Tunnel (Appendix F of the PBO). Since that time, Denver Water has updated its hydrologic model (PACSM) and the updated average annual depletions will be presented in this memo.

Summary of Past Consultations

October 2000 - Gross Reservoir was previously consulted on by the Federal Energy Regulatory Commission (FERC) and USFWS between 1997 and 2000. Under cover of letters dated December 5, 1997 and April 27, 1998, Denver Water sent hydrology information concerning the Gross Reservoir Hydroelectric Project FERC No. 2035 to Mr. Lee Carlson with the USFWS. The information included historical and future South Platte River and Colorado River depletions related to the FERC relicensing. The information provided to the USFWS showed that the average annual depletions to the Colorado River basin would increase by 5,813 acre-feet (AF) (Table 1). This value was calculated as the increase in Moffat Tunnel diversions (including depletions caused by the Gumlick Tunnel) from the then-current average annual demand of 265,000 AF and the full use of the existing system average annual demand of 345,000 AF. At that time, the average annual Moffat Tunnel diversions for the full use of existing system (demand of 345,000 AF/yr) was calculated as being 66,406 AF. Denver Water now estimates that the average annual Moffat Tunnel diversions are 66,512 AF/yr at the same demand of 345,000 AF/yr. The difference between what Denver Water calculated about ten years ago compared to the current calculation is 106 AF/year (66,512 AF/yr versus 66,406 AF/yr), a difference of 0.16%. The USFWS issued a Biological Opinion (BO) to FERC dated October 12, 2000 for 5,813 AF/yr of new depletions to the Colorado River.

July 2006 - Williams Fork Reservoir was previously consulted on by FERC and USFWS in 2006. Williams Fork Reservoir, Dam, and Powerplant were relicensed by FERC in 2006 because the original FERC license was set to expire. The relicensing did not allow for new depletions, but did specify the total depletions the operations of Williams Fork Reservoir would cause to the Colorado River associated with a demand of 345,000 AF/yr. These depletions were specific to the operation of Williams Fork Reservoir resulting from exchanges to Dillon Reservoir, Roberts Tunnel, Henderson Mill, Moffat Tunnel (including depletions caused by the Gumlick Tunnel), reservoir evaporation, and substitution for Green Mountain Reservoir. The USFWS issued a BO to FERC dated July 6, 2006 acknowledging 27,475 AF/yr of historic depletions to the Colorado River (Table 1).

July 2009 - Consultation for the Moffat Project Draft EIS was completed by the Corps in 2009 for Denver Water's entire collection system. The baseline for this consultation was a demand of 345,000 AF/yr (i.e., full use of Denver Water's existing system). Under the Proposed Action (i.e., full use of the existing system plus the Moffat Project), depletions from the Colorado River would increase as water demand increased to 363,000 AF/yr. Depletions from the Colorado River, including all exchanges and substitutions, were quantified as the average annual amount of water delivered through the Moffat (including Gumlick) and Roberts tunnels. The USFWS issued a BO to the Corps on July 31, 2009 acknowledging that the proposed Moffat Project would deplete an additional 15,121 AF/yr from the Colorado River (Table 1). However, based on discussions with the USFWS, the USFWS will issue a BO in 2013, which will replace the 2009 BO (e-mail from Patty Gelatt, 12/27/12)

Table 1 shows the total amount of average annual Colorado River depletions that have been the subject of prior Section 7 consultations (not including the 2009 consultation).

Table 1 Denver Water's Prior Colorado River Consultations (acre-feet/year)					
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)*	Total
Gross Reservoir FERC	-	-	5,813*	-	5,813
Williams Fork FERC	-	-	27,475**	-	27,475
Moffat Project DEIS	-	-	-		
Total Consultations	-	-	33,288		33,288

* New depletions per the 15-mile Reach PBO (post 1995).

** Historic depletions per the 15-mile Reach PBO (occurred on or before Sept. 30, 1995).

Information for This 2012-2013 Consultation

Based on discussions with the USFWS, it became evident that the 2009 consultation only addressed additional future depletions associated with the Moffat Project, which is from the increase in water demand from 345,000 to 363,000 AF/yr. Since the Corps is re-initiating Section 7 consultation, Denver Water is revising the Colorado River depletions analysis to include Denver Water's entire system, at four different water demand levels (as described below). Depletions associated with demand levels from 265,000 to 345,000 AF/yr were not specifically consulted on with the USFWS and are the subject of this consultation. Tables 2 and 3 show the difference in average annual depletions in the Colorado River basin between the following hydrologic scenarios:

- Baseline Condition (Base265) – This represents Denver Water's depletions in the mid-to-late 1990s based on an average annual demand of 265,000 AF/yr.
- Current Condition (Base285) – This represents depletions associated with current operation of Denver Water's existing system based on an average annual demand of 285,000 AF/yr.

- Full Use of Existing System (Base345) – This represents future depletions with full use of the existing system based on an average annual demand of 345,000 AF/yr.
- Proposed Action (Base363) – This represents future depletions with full use of the existing system, plus the Moffat Project (Proposed Action) based on an average annual demand of 363,000 AF/yr (i.e., 345,000 + 18,000 = 363,000 AF/yr).

The Base265 information relies on information from the Gross Reservoir FERC relicensing effort and model simulation that were developed in 1996-1997. The Base 285, 345 and 363 information is from the Moffat Project EIS using PACSM simulations completed in February 2007. (Although model results are reported to the exact acre-foot, actual results would not be this precise.)

Table 2 shows Denver Water's diversions, and therefore depletions, from the Colorado River.

Table 2 Denver Water's Total Colorado River Average Annual Depletions at Four Demand Levels* (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Roberts Tunnel Depletions	66,436	69,676	96,939	101,775
Moffat Tunnel Depletions	60,593	63,799	66,512	76,797
Total Colorado River Depletions	127,029	133,475	163,451	178,572

*These depletions are based solely on Moffat Tunnel (which incorporates Gumlick Tunnel) and Roberts Tunnel diversions. These values do not include depletions attributable to evaporation from Denver Water's reservoirs, which are described later in the memo.

Table 3 summarizes the increase in depletions (i.e., diversions) from the Moffat and Roberts tunnels between each demand level and the total additional depletions from the Colorado River. These values represent the additional depletions associated with higher demand.

Table 3 Denver Water's Additional Colorado River Average Annual Diversions at Four Demand Levels (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)²	Full Use of Existing System (Base345)³	Proposed Action (Base363)⁴
Roberts Tunnel Depletions	-	3,240	27,263	4,836
Moffat Tunnel Depletions	-	3,206	2,713	10,285
Total Additional Colorado River Depletions	-	6,446	29,976	15,121

² Values represent the difference in depletions between the demand of 285,000 AF and 265,000 AF.

³ Values represent the difference in depletions between the demand of 345,000 AF and 285,000 AF.

⁴ Values represent the difference in depletions between the demand of 363,000 AF and 345,000 AF.

Reservoir Evaporation

The average annual net reservoir evaporation from Denver Water's west slope reservoirs is shown in Table 4, which is included at the request of the USFWS.

Table 4 Average Annual Evaporation from Denver Water West Slope Reservoirs (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Dillon Reservoir	5,935	5,847	5,494	5,368
Williams Fork Reservoir	3,660	3,227	3,355	3,331
Meadow Creek Reservoir	169	202	201	199
Wolford Mountain Reservoir (DW portion) ⁵	1,040	1,083	1,031	1,027
Total Evaporation	10,804	10,359	10,081	9,925

Summary of Depletions to the Colorado River for this Consultation

Table 5 Summary of Denver Water's Colorado River Average Annual Depletions (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Colorado River Diversions	127,029	133,475	163,451	178,572
Evaporation	10,804	10,359	10,081	9,925
Total Depletions	137,833	143,834	173,532	188,497

As Denver Water's demand continues to increase, the associated depletions from the Colorado River will also increase. The Upper Colorado River Recovery Program defines existing depletions as those occurring on or before September 30, 1995. At that time, Denver Water's average annual demand was 265,000 AF and 127,029 AF of water was diverted from the Colorado River on an average annual basis to the East Slope to meet this demand (Tables 2 and 5). Denver Water's proposed Moffat Project would allow Denver Water to meet an average annual demand of 363,000 AF, which would deplete 178,572 AF/yr on average from the Colorado River (Tables 2 and 5). This would be a total increase (Base265 to Base363) of 51,543 AF/yr (178,572 – 127,029). As shown in Table 1, prior consultations have consulted on a total of 33,288 AF/yr.

⁵ Although the Colorado River Water Conservation District is responsible for all evaporation at Wolford Mountain Reservoir, the value shown is the proportionate amount of evaporation due to Denver Water's share of the reservoir.

Thus, the additional amount of water that is subject to this consultation is 18,255 AF/yr (51,543 – 33,288), which is the amount of water Denver Water will divert (system-wide) on an average annual basis from the Colorado River as demand increases from 265,000 AF/yr to 363,000 AF/yr.

Because of lower reservoir contents at a higher demand level, there will be correspondingly less evaporative loss. Thus, on an average annual basis, Denver Water's west slope reservoirs will evaporate 879 AF/yr less at demand of 363,000 AF/yr compared to a demand of 265,000 AF/yr (Tables 4 and 5). In summary, Denver Water's total "new" depletion from the Colorado River for this consultation is **17,376 AF/yr** (18,255 – 879). The "historic" depletion is **171,121 AF/yr** (188,497 from Table 5 – 17,376).

South Platte River Diversions and Depletions

Under the Proposed Action, Denver Water would also increase diversions from the South Platte River. On February 20, 2009, the Corps submitted a request to the USFWS for Section 7 consultation using the template BA. The average annual depletions to the South Platte River associated with the proposed Moffat Project were estimated to be 1,607 AF/yr. Denver Water is a member of the South Platte Water Related Activities Program, which covers depletions caused by members participating in the PRRIP implemented on January 1, 2007. The PRRIP considers the "baseline" for Denver Water to be water demand in 1995, which was 265,000 AF/yr.

Denver Water is providing the following revised descriptive information as requested by the USFWS for Section 7 consultation.

- Location of water use – Denver Water's South Platte collection system, including reservoirs, is located throughout the South Platte watershed.
- Use of water – The water is decreed for municipal and industrial purposes through multiple water right decrees.
- Sources of water – The majority of Denver Water's South Platte River supplies are diverted from the river at Strontia Springs Reservoir or downstream at Conduit 20 intake in Waterton Canyon. Some water is also diverted from facilities on Bear Creek, South Boulder Creek, Ralston Creek, and Cherry Creek.
- Quantities of water – The total South Platte River diversions (including reservoir evaporation) associated with Denver Water's past, existing and future demand levels since implementation of the PRRIP is 48,767 AF/yr (Table 8). The total average annual diversions with the Moffat Project increase to 3,460 AF/yr (Table 8).

Revised Calculations of Denver Water's Depletions and Diversions

Even though the USFWS does not require quantification of existing and new depletions for water-related activities, Denver Water is providing the following information on how it calculates diversions and depletions of South Platte River water by its customers:

1. The first step is to determine the total South Platte River *diversions* that are used to meet customer demand. The total South Platte River *diversion* is calculated as the difference between total customer demand (deliveries of treated, raw, and non-potable water) and the amount supplied by Denver Water's Colorado River diversions.
2. The second step is to determine the South Platte River *depletions* that are associated with the South Platte River diversions. This second step is required because much of the South Platte water diverted from the river to meet customer demand returns to the river via wastewater treatment plants and as lawn irrigation return flows. For the water used indoors, the amount of water consumed is estimated to be 18% (i.e., 82% returns to the river), and for the water used outdoors the amount consumed is estimated to be 92% (i.e., 8% returns to the river).

Table 6 shows the average annual *diversions* from the South Platte River basin as a result of average annual diversions between the Baseline Condition (Base265), Existing Use of Existing System (Base285), Full Use of Existing System (Base345) and Proposed Action (Base363).

The *depletion* calculations in Table 6 are based on the estimates that 58% of the water is used by customers for indoor use, and the remaining 42% is used outdoors, primarily for lawn and landscape irrigation purposes.

Table 6 Denver Water's Average Annual Diversions and Depletions from the South Platte River at Four Demand Levels⁶ (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Total Demand	265,000	285,000	345,000	363,000
Colorado River Diversions	-127,029	-133,475	-163,451	-178,572
South Platte River Diversions	=137,971	=151,525	=181,549	=184,428
Calculation of South Platte Depletions				
South Platte Indoor Depletion (= 58% of diversion x 18% consumptive use)	14,404	15,819	18,954	19,254
South Platte Outdoor Depletion (= 42% of diversion x 92% consumptive use)	+53,312	+58,549	+70,151	+71,263
South Platte Depletion⁶	=67,716	=74,368	=89,104	=90,517⁷

⁶ These calculations do not include reservoir evaporation and "5K Water". Refer to Table 9.

⁷ In the Moffat Project BA (2009), the average annual increase in South Platte River depletions for the Proposed Action was calculated to be 1,607 AF/yr. This calculation was based on the change in river flow conditions between the Full Use Existing System (345,000 AF/yr demand level) and the Proposed Action. The revised calculations for this consultation are based on depletions for each demand level simulation. As shown in Table 6, the average annual depletions due to the Moffat Project are 1,413 AF/yr (90,517 - 89,104). The difference between the two estimates is very small (approximately 0.02% of Denver Water's total South Platte River depletions).

As shown in the Table 6, Denver Water will divert an additional 2,879 AF/yr on average from the South Platte River (184,428 – 181,549). These diversions are associated with meeting additional demands from Denver Water’s collection system.

As shown in Table 6, the average annual increase in South Platte River depletions under the Proposed Action is 1,413 AF/yr (90,517 – 89,104) and total average annual depletions since the implementation of the PRRIP is 22,801 AF/yr (90,517 – 67,716).

Reservoir Evaporation

The average annual net reservoir evaporation from Denver Water’s east slope reservoirs is shown in Table 7, which is included at the request of the USFWS. The additional average annual evaporation associated with the Proposed Action is 581 AF/yr (18,452 – 17,871).

Table 7 Average Annual Evaporation at Denver Water East Slope Reservoirs (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
South Platte River Basin				
Antero Reservoir	3,430	3,671	3,625	3,602
Eleven Mile Reservoir	6,091	5,950	5,838	5,856
Cheesman Reservoir	1,125	1,081	1,074	1,058
Strontia Springs (all)	114	142	136	132
Marston Reservoir	1,326	1,354	1,350	1,346
Chatfield Reservoir	2,909	2,946	2,982	2,974
Reuse Reservoir ⁸	N/A	319	428	449
Exchange Reservoir	N/A	418	1,240	1,320
Gross Reservoir ⁹	468	452	477	991
Ralston Reservoir	279	321	321	324
Remaining (estimated) ¹⁰	400	400	400	400
Total South Platte River	16,142	17,054	17,871	18,452

⁸ The combined capacity of the Reuse Reservoir and the Exchange Reservoir is 13,500 AF/yr in Base285, and 30,000 AF/yr in Base345 and Base363. The annual water demand for the recycling project is 7,000 AF in Base285, and 17,500 AF in Base345 and Base363. These are also known as “South Platte Gravel Pits”.

⁹ Gross Reservoir capacity is 41,811 AF in Base265, Base285 and Base345, and 113,811 AF in Base363.

¹⁰ The remaining reservoirs include Harriman Reservoir, Upper and Lower Soda Lakes, Upper and Lower Long Lakes, and Platte Canyon Reservoir, with a total capacity of approximately 4,140 AF. Average annual evaporation from these reservoirs is estimated to be about 400 AF.

Summary of Diversions from the South Platte River for this Consultation

Table 8¹¹ Summary of Denver Water's Total South Platte River Average Annual Diversions (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
South Platte River	137,971	151,525	181,549	184,428
Evaporation	+16,142	+17,054	+17,871	+18,452
Total South Platte Diversions	154,113	168,579	199,420	202,880

As shown in Table 8, the Proposed Action would result in total additional diversions of 3,460 AF/yr on average from the South Platte River (202,880 – 199,420). Overall, total average annual diversions from the South Platte River since implementation of the PRRIP (Baseline Conditions) is 48,767 (202,880 – 154,113).

Summary of Depletions to the South Platte River for this Consultation

Table 9 Summary of Denver Water's Total South Platte River Average Annual Depletions (acre-feet/year)				
	Baseline (Base265)	Current/Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
South Platte River	67,716	74,368	89,104	90,517
Evaporation	16,142	17,054	17,871	18,452
5K Water Delivery ¹²	N/A	5,000	5,000	5,000
Total South Platte	83,858	96,422	111,975	113,969

Table 9 summarizes the total average annual depletions that are used to meet customer demand, reservoir evaporation, and the 5K Water deliveries. The Proposed Action would result in additional depletions of 1,994 AF/yr (113,969 – 111,975). Overall, average annual depletions to the South Platte River since implementation of the PRRIP (Baseline Conditions) are 30,111 AF/yr (113,969 – 83,858).

¹¹ Average annual evaporation from Denver Water's East Slope reservoirs is summarized in Table 8. Evaporation was not included in Table 6 as it summarizes diversions and depletions based upon return flows. Evaporation does not return to the river. Therefore, evaporation is calculated in Table 7 and included in the total diversions from the South Platte in Table 8.

¹² 5K Water is the amount of reusable water Denver Water delivers to South Adams County Water and Sanitation.

The South Platte River depletion calculations shown in Table 9 disregard the return flows from the additional water imported by Denver Water from the Colorado River basin. If return flows from these imports are considered, the net depletions to the South Platte decrease substantially as shown in Table 10. The Proposed Action would increase return flows to the South Platte River by 6,706 AF/yr (23,040 – 29,746). Overall, average annual depletions to the South Platte River since implementation of the PRRIP (Baseline Conditions) is 3,865 AF/yr (23,040 – 19,175) when return flows from the Colorado River diversion are included.

Table 10 Average Annual Return Flows from Colorado River Imports to the South Platte River and Average Annual Net South Platte River Depletions (acre-feet/year)				
	Baseline (Base265)	Current/ Existing Use of System (Base285)	Full Use of Existing System (Base345)	Proposed Action (Base363)
Colorado River Imports	127,029	133,475	163,451	178,572
Colorado River Indoor Return Flow (58% of import x 82% return)	60,415	63,481	77,737	84,929
Colorado River Outdoor Depletion (42% of import x 8% return)	4,268	4,485	5,492	6,000
Total Colorado River Return Flows to South Platte River	64,683	67,965	82,229	90,929
Total South Platte	83,858	96,422	111,975	113,969
Net South Platte Depletions¹³	19,175	28,457	29,746	23,040

Denver Water Facilities

The follow is a list of raw water facilities that Denver Water uses to meet customer demand. However, some ditches have multiple names and not all diversions at a facility may be attributable to Denver Water.

Colorado River

Reservoirs: Dillon, Williams Fork, Wolford Mountain (Denver Water’s portion), and Meadow Creek

Tunnels: Roberts, Moffat, Vasquez, and Gumlick

Ditches/Canals: Those associated with water diversions for the Gumlick and Moffat Tunnels

South Platte River

Reservoirs: Antero, Eleven Mile, Cheesman, Strontia Springs, Chatfield (Denver Water’s portion), Gross, Ralston, Upper and Lower Long Lakes, Upper and Lower Soda Lakes, Harriman, Platte Canyon, wells, and South Platte Gravel Pit storage

Conduits: 16, 20, 22, and 26

¹³ “Total South Platte” less “Total Colorado River Return Flows to South Platte River”.

Ditches/Canals: High Line, South Boulder, Long Lakes, Harriman (Denver Water's portion), Old Last Chance, and water rights where the consumptive use has been transferred to municipal purposes¹⁴

Pumps: Chatfield and Kassler

¹⁴ Denver Water has changed a number of water rights from the decreed purpose to municipal use. These water rights had specific points of diversion (such as Nevada Ditch), but the point of diversion was changed to one of Denver Water's other diversion points (such as Conduit 20 inlet or Strontia Springs). The change in diversion point allows Denver Water to divert the consumptive use portion of these water rights into its raw water collection system.

Attachment C

***Hydrology Table H-3.41 from the Moffat Collection
System Project Final EIS***

Attachment C

Hydrology Table H-3.41 from the Moffat Final EIS

Table H-3.41. North Fork South Platte River below Geneva Creek Gage (cfs)

Flow Change and % Change are based on comparisons to Full Use Existing System														
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
45 Year Average														
Full Use Existing System		204.6	114.8	113.8	97.1	96.9	87.5	123.1	193.5	355.7	318.3	332.1	340.4	198.2
No Act	Flow	218.0	120.0	122.2	107.1	107.2	96.9	132.8	202.4	364.2	343.1	361.6	366.1	211.8
Alt 1a	Flow	200.8	86.4	82.2	68.8	68.0	63.8	112.2	248.9	403.5	380.4	375.0	362.4	204.4
Alt 1c	Flow	200.9	86.6	82.3	68.7	68.2	63.9	112.0	249.0	403.7	381.3	378.4	364.3	204.9
Alt 8a	Flow	200.7	86.6	82.3	69.3	68.4	64.1	111.3	247.9	402.0	379.0	372.9	360.3	203.7
Alt 10a	Flow	200.4	86.6	82.3	69.3	68.4	64.0	111.4	248.3	402.2	378.9	372.8	360.7	203.8
Alt 13a	Flow	200.2	86.2	82.0	68.5	68.2	63.6	111.6	248.9	402.7	380.9	373.6	361.3	204.0
Flow change from Full Use Existing System														
No Act	Flow Change	13.4	5.2	8.3	10.0	10.4	9.5	9.7	8.8	8.5	24.8	29.5	25.6	13.6
Alt 1a	Flow Change	-3.8	-28.4	-31.7	-28.3	-28.9	-23.7	-10.9	55.4	47.8	62.2	42.9	21.9	6.2
Alt 1c	Flow Change	-3.7	-28.2	-31.5	-28.5	-28.7	-23.6	-11.1	55.4	48.0	63.0	46.3	23.9	6.8
Alt 8a	Flow Change	-3.9	-28.2	-31.6	-27.8	-28.5	-23.4	-11.8	54.4	46.3	60.7	40.8	19.9	5.6
Alt 10a	Flow Change	-4.2	-28.2	-31.5	-27.8	-28.5	-23.5	-11.7	54.8	46.5	60.7	40.7	20.2	5.6
Alt 13a	Flow Change	-4.4	-28.7	-31.8	-28.6	-28.7	-23.9	-11.5	55.3	46.9	62.6	41.4	20.9	5.8
Percent change in flow from Full Use Existing System														
No Act	% Change	7%	5%	7%	10%	11%	11%	8%	5%	2%	8%	9%	8%	7%
Alt 1a	% Change	-2%	-25%	-28%	-29%	-30%	-27%	-9%	29%	13%	20%	13%	6%	3%
Alt 1c	% Change	-2%	-25%	-28%	-29%	-30%	-27%	-9%	29%	13%	20%	14%	7%	3%
Alt 8a	% Change	-2%	-25%	-28%	-29%	-29%	-27%	-10%	28%	13%	19%	12%	6%	3%
Alt 10a	% Change	-2%	-25%	-28%	-29%	-29%	-27%	-10%	28%	13%	19%	12%	6%	3%
Alt 13a	% Change	-2%	-25%	-28%	-29%	-30%	-27%	-9%	29%	13%	20%	12%	6%	3%
Dry Year Average (1950, 1954, 1963, 1977, 1981)														
Full Use Existing System		277.3	132.9	133.9	103.9	114.4	105.7	279.2	319.6	436.5	413.9	388.2	346.1	254.3
No Act	Flow	298.9	138.8	143.9	112.4	125.0	116.5	290.8	324.8	453.4	430.0	385.5	325.0	262.1
Alt 1a	Flow	281.7	101.7	104.3	77.1	89.2	75.5	268.4	373.7	506.1	487.0	402.8	327.3	257.9
Alt 1c	Flow	281.1	101.7	104.2	77.0	89.5	75.5	268.1	373.4	505.2	485.3	402.4	327.0	257.5
Alt 8a	Flow	282.6	101.9	104.3	77.4	89.4	75.5	267.7	373.5	505.5	486.6	402.9	328.2	257.9
Alt 10a	Flow	281.6	102.3	104.2	77.0	89.1	75.7	268.1	373.8	505.8	485.8	402.5	327.7	257.8
Alt 13a	Flow	279.0	101.8	104.3	77.0	89.7	75.8	268.1	374.7	506.5	486.4	403.6	328.1	257.9
Flow change from Full Use Existing System														
No Act	Flow Change	21.6	5.9	10.0	8.4	10.6	10.8	11.6	5.2	16.8	16.0	-2.8	-21.1	7.8
Alt 1a	Flow Change	4.4	-31.2	-29.7	-26.9	-25.2	-30.2	-10.8	54.1	69.6	73.1	14.5	-18.8	3.6
Alt 1c	Flow Change	3.8	-31.3	-29.7	-26.9	-25.0	-30.2	-11.1	53.8	68.6	71.3	14.1	-19.1	3.2
Alt 8a	Flow Change	5.3	-31.0	-29.7	-26.6	-25.1	-30.1	-11.5	53.9	69.0	72.7	14.6	-17.8	3.6
Alt 10a	Flow Change	4.4	-30.7	-29.7	-27.0	-25.4	-30.0	-11.1	54.2	69.3	71.8	14.3	-18.3	3.5
Alt 13a	Flow Change	1.7	-31.1	-29.7	-26.9	-24.7	-29.9	-11.1	55.1	70.0	72.5	15.3	-18.0	3.6
Percent change in flow from Full Use Existing System														
No Act	% Change	8%	4%	7%	8%	9%	10%	4%	2%	4%	4%	-1%	-6%	3%
Alt 1a	% Change	2%	-23%	-22%	-26%	-22%	-29%	-4%	17%	16%	18%	4%	-5%	1%
Alt 1c	% Change	1%	-24%	-22%	-26%	-22%	-29%	-4%	17%	16%	17%	4%	-6%	1%
Alt 8a	% Change	2%	-23%	-22%	-26%	-22%	-29%	-4%	17%	16%	18%	4%	-5%	1%
Alt 10a	% Change	2%	-23%	-22%	-26%	-22%	-28%	-4%	17%	16%	17%	4%	-5%	1%
Alt 13a	% Change	1%	-23%	-22%	-26%	-22%	-28%	-4%	17%	16%	18%	4%	-5%	1%
Wet Year Average (1949, 1970, 1973, 1983, 1984)														
Full Use Existing System		176.8	97.4	97.5	82.5	98.8	69.9	68.4	167.1	350.6	247.5	235.2	256.0	162.3
No Act	Flow	200.2	105.9	111.1	97.3	108.9	78.6	72.6	174.1	354.4	253.5	238.7	280.3	173.0
Alt 1a	Flow	189.9	75.3	71.7	52.4	62.0	48.9	59.2	181.7	353.0	253.7	267.7	284.5	158.3
Alt 1c	Flow	189.1	75.9	71.8	52.4	62.1	48.9	57.6	182.1	353.1	253.8	270.6	289.0	158.9
Alt 8a	Flow	187.2	75.6	71.7	52.3	62.3	49.1	59.2	181.7	353.0	253.0	268.4	283.7	158.1
Alt 10a	Flow	187.0	75.6	71.7	52.3	62.3	48.9	59.7	181.6	353.0	253.9	267.3	285.5	158.2
Alt 13a	Flow	189.7	75.2	71.7	52.4	62.1	47.2	59.4	181.5	353.0	253.1	266.5	286.5	158.2
Flow change from Full Use Existing System														
No Act	Flow Change	23.3	8.6	13.6	14.8	10.1	8.7	4.3	7.0	3.8	5.9	3.5	24.3	10.7
Alt 1a	Flow Change	13.0	-22.1	-25.8	-30.0	-36.9	-21.0	-9.1	14.7	2.4	6.1	32.5	28.5	-4.0
Alt 1c	Flow Change	12.3	-21.4	-25.7	-30.1	-36.7	-21.0	-10.8	15.0	2.5	6.3	35.4	33.0	-3.4
Alt 8a	Flow Change	10.4	-21.8	-25.8	-30.2	-36.5	-20.8	-9.2	14.6	2.4	5.4	33.1	27.7	-4.2
Alt 10a	Flow Change	10.2	-21.7	-25.8	-30.2	-36.5	-21.0	-8.7	14.5	2.5	6.4	32.1	29.5	-4.1
Alt 13a	Flow Change	12.8	-22.2	-25.8	-30.0	-36.7	-22.7	-9.0	14.5	2.4	5.6	31.2	30.6	-4.1
Percent change in flow from Full Use Existing System														
No Act	% Change	13%	9%	14%	18%	10%	13%	6%	4%	1%	2%	1%	9%	7%
Alt 1a	% Change	7%	-23%	-26%	-36%	-37%	-30%	-13%	9%	1%	2%	14%	11%	-2%
Alt 1c	% Change	7%	-22%	-26%	-36%	-37%	-30%	-16%	9%	1%	3%	15%	13%	-2%
Alt 8a	% Change	6%	-22%	-26%	-37%	-37%	-30%	-13%	9%	1%	2%	14%	11%	-3%
Alt 10a	% Change	6%	-22%	-26%	-37%	-37%	-30%	-13%	9%	1%	3%	14%	12%	-3%
Alt 13a	% Change	7%	-23%	-26%	-36%	-37%	-32%	-13%	9%	1%	2%	13%	12%	-3%

Note:

Alt 1a occurrences in this attachment refer to the Proposed Action.

**Updated FWS Position Paper on ESA Consultations
on Greenback Cutthroat Trout**

**Updated FWS position paper on ESA consultations on greenback cutthroat trout,
including the cutthroat referred to as Lineage GB
(Updated October 4, 2012)**

Background

The greenback cutthroat trout (*Oncorhynchus clarkii stomias*) was listed as an endangered species in 1967 under a precursor to the Endangered Species Act (Act). It was re-listed as endangered under the current Act in 1974, and downlisted to threatened status, with a 4(d) rule allowing catch and release fishing, in 1978.

Until recently, greenback cutthroat trout have been considered native to the headwaters of the South Platte and Arkansas River drainages in eastern Colorado, and a few headwater tributaries of the South Platte in a small area of southeastern Wyoming (Behnke 1992). Another cutthroat trout subspecies, the Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*), is known to occur in the Colorado and Green River drainages in the west slope of Colorado, southwestern Wyoming, and eastern Utah. The Rio Grande cutthroat trout (*Oncorhynchus clarkii virginialis*), a candidate species, is known to occur within the Rio Grande drainage. A fourth subspecies in Colorado, the yellowfin cutthroat trout (*Oncorhynchus clarkii macdonaldi*), was known to occur in the headwaters of the Arkansas River drainage and is believed to be extinct.

A recent genetic study (Metcalf et al. 2012) provided new information on the native range of the cutthroat trout in Colorado, as provided in the following text:

- Six lineages were originally present in the state, of which two lineages have gone extinct.
- Greenbacks were native only to the South Platte drainage.
- The only remaining greenback cutthroat trout population, a federally threatened species, is present in Bear Creek in the Arkansas drainage.
- The headwaters of the Arkansas drainage were occupied by the yellowfin cutthroat trout, now extinct.
- Cutthroat trout on the west slope of Colorado are actually divided into two lineages; the native range of the Colorado River cutthroat, also referred to as Lineage CR, is located in the Yampa/White River drainages while another lineage, referred to as Lineage GB at this time, has a native range that is located in the Gunnison/Colorado River drainages.
- Another cutthroat trout lineage was present in the San Juan Mountains; it is now believed to be extinct.
- Other cutthroat trout present in streams on the east slope, which have been previously considered to be greenback cutthroat trout, are actually cutthroats that had been stocked earlier from Colorado River cutthroat and Lineage GB streams originating on the west slope of Colorado.
- The Rio Grande cutthroat trout continues to remain within its native range of the Rio Grande drainage.

The Service has not confirmed its position on the new information by Metcalf et al. (2012) and is waiting for the completion of a meristic study of cutthroat trout in Colorado prior to conducting any reviews and to making decisions on listing status. The meristic study, which was designed to complement the genetic study, is being conducted by researchers at Colorado State University and should be completed in fall of 2012. Following completion of the meristic study, the Service will conduct a scientific peer review of the genetic and meristic studies together, involving genetic and cutthroat experts from throughout the country. A workshop for the peer reviewers is tentatively scheduled for spring 2013. Following this scientific review, the Service will conduct a status review of the cutthroat groups, evaluating threats and population trends, etc. If we determine that it is appropriate to list, or revise the listing of, a cutthroat group, the Service will conduct a formal rulemaking process.

Until the reviews and rulemaking, if necessary, have been completed, the Service will not change the listing status of the greenback. Therefore, all protection that is currently afforded to cutthroat populations that have been identified as greenback, including Lineage GB and Lineage CR on the eastern slope and Lineage GB on the western slope of Colorado, will remain in place until rulemaking occurs, if necessary.

Section 7 Issue

The identification of Lineage GB fish in western Colorado and eastern Utah has raised concerns regarding whether there is a need for application of the Act (particularly section 7 consultation) in these areas. Although the greenback was listed rangewide, its distribution was designated only as Colorado. Thus, any greenback lineage fish found in Utah or Wyoming would not currently receive any protections under the Act.

Until the review and rulemaking process, if necessary, have been completed, the Service advises federal agencies to continue to conduct consultations for actions that may affect the currently listed cutthroat trout in Colorado; therefore, this will include all cutthroat populations that have been identified as greenback, including Lineage GB and Lineage CR on the eastern slope and Lineage GB on the western slope of Colorado.

Colorado River Cutthroat Trout Conservation

The Colorado River cutthroat trout (CRCT) Conservation Team updated the Conservation Strategy and Agreement in March 2006. Signatories to the Agreement include the State wildlife agencies of Colorado, Utah, and Wyoming; the USFS, the Bureau of Land Management (BLM), and the Service (CRCT Conservation Team 2006). The purpose of the strategy is to provide a framework for the long-term conservation of the Colorado River cutthroat, and to reduce or eliminate the threats that warrant its status as a sensitive species or species of concern by federal and state resource agencies. The objectives of the strategy are to identify and characterize all CRCT core and conservation populations, secure and enhance conservation populations, restore populations, secure and enhance watershed conditions, public outreach, data sharing, and coordination. The three States, USFS, BLM, and the Service have committed to implement the strategy.

The Service believes that implementation of the CRCT strategy to conserve and protect Colorado River cutthroat trout populations throughout their range will also adequately protect any Lineage GB populations. Therefore, agencies should include these activities in their Biological Evaluations/Assessments (BE/BAs) as conservation measures for Lineage GB populations.

Process

To ensure an adequate Administrative Record for all agency actions that could be subject to section 7 consultation, it will be important for federal agencies to document the presence of the protected cutthroat populations and the conservation measures being incorporated for those populations, and to evaluate the effects of their actions on the populations in their BE or BA. The Service will issue concurrence letters, or initiate formal consultation if there are adverse effects that cannot be avoided. We are available to discuss specific projects with agency personnel during the development of a BE or BA. The Service's contact in the Lakewood office is Leslie Ellwood (303-236-4747) and the contact in the Grand Junction is Patty Gelatt (970-243-2778 x 26).

Literature Cited

Behnke, R.J. 1992. Greenback cutthroat trout. pp. 146-148 *in* Native trout of western North America. American Fisheries Society Monograph 6, Bethesda, Maryland. 275 pp.

CRCT Coordination Team. 2006. Conservation Strategy for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) in the States of Colorado, Utah, and Wyoming. Colorado Division of Wildlife, Fort Collins. 24 pp.

Metcalf, J.L., S.L. Lovell, C.M. Kennedy, K.B. Rogers, D. McDonald, J. Epp, K. Keepers, A. Cooper, J.J. Austin, and A.P. Martin. 2012. Historical stocking data and 19th century DNA reveal human-induced changes to native diversity and distribution of cutthroat trout. *Molecular Ecology* (2012).

FINAL BIOLOGICAL OPINION

**Letter to Kiel Downing, Corps, from Susan Linner,
USFWS – December 6, 2013**



United States Department of the Interior



FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
COLORADO FIELD OFFICE
P.O. BOX 25486, DFC (MS 65412)
DENVER, COLORADO 80225-0486

IN REPLY REFER TO:

ES/CO: LK-6-C0-13-F-006

ES/CO: GJ-6-C0-99-F-033-CP126

TAILS: 06E24000-2012-F-0747

December 6, 2013

Mr. Kiel Downing
Denver Regulatory Office
U.S. Army Corps of Engineers
9307 S. Wadsworth Boulevard
Littleton, Colorado 80218-6901

Dear Mr. Downing:

This final biological opinion is provided in response to your August 14, 2012, and August 14, 2013, requests to reinitiate formal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA). Your August 14, 2013, letter and revised Biological Assessment (BA) described the potential effects of the City and County of Denver's Moffat Collection System Project (Moffat Project or Project), U.S. Army Corps of Engineers (Corps) permit application number NW0-2002-80762-DEN, on federally listed species and designated critical habitat. This biological opinion replaces the opinion dated July 31, 2009 (BO# ES/LK-6-C0-09-F-021, TAILS 65412-2009-F-0520; ES/GJ-6-C0-99-F-033-CP101), that was issued for the Project.

The Federal action reviewed in this biological opinion is operation of the Moffat Project, which includes expansion of Gross Reservoir, located in Boulder County, and increased stream diversions in Summit, Grand, Park, Douglas, and Boulder counties, Colorado. In addition to full use of its existing water collection system, the Applicant - the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water), would enlarge the existing Gross Reservoir to a storage capacity of 113,811 acre-feet. This would be accomplished by raising the reservoir's concrete gravity arch dam. Denver Water also proposes to create an additional 5,000 acre-feet of storage in Gross Reservoir (for a grand storage total of 118,811 acre-feet) for the cities of Boulder and Lafayette by raising the dam an additional 6 feet. Water depletions associated with Boulder and Lafayette's proposed, additional water storage in Gross Reservoir will be addressed in a separate Section 7 consultation.

Whereas the July 31, 2009, opinion only addressed additional future depletions associated with the Project, this biological opinion will address past, existing, and future diversions for Denver Water's *entire system*, which includes Gross Reservoir. This opinion will cover all of Denver

Water's existing and future depletions up to an average annual demand of 363,000 acre-feet per year from the upper Colorado River and South Platte River basins.

The U.S. Fish and Wildlife Service (Service) has reviewed the information contained in the letter and revised BA submitted by your office on August 14, 2013.

The Service is working with your office to separately address water depletions associated with Boulder and Lafayette's proposed 5,000 acre-foot "environmental pool" in Gross Reservoir. This additional storage would be filled with water provided by Boulder and Lafayette, and released to enhance aquatic habitat in South Boulder Creek downstream of Gross Reservoir. Water storage rights and other specifics on Boulder and Lafayette's use of their water stored in Gross Reservoir should be provided to the Service for this separate Section 7 consultation; including if necessary, formal consultation and a resulting biological opinion.

We concur with your determinations of "likely to adversely affect" for the endangered whooping crane (*Grus Americana*), least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirynchus albus*), the threatened northern great plains population of the piping plover (*Charadrius melodus*), and the western prairie fringed orchid (*Platanthera praeclara*) in the central and lower Platte River in Nebraska. We also concur with your determination of "likely to adversely affect" for designated whooping crane critical habitat in Nebraska. We concur with your determination of "not likely to adversely affect" for the endangered American burying beetle (*Nicrophorus americanus*) in Nebraska.

The Service also concurs with your determinations of "likely to adversely affect" for the endangered Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and their designated critical habitat in the upper Colorado River basin.

We concur with your determination of "not likely to adversely affect" for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) in Colorado.

DESCRIPTION OF THE FEDERAL ACTION

The Federal action is Denver Water's need for a section 404 individual permit from the Corps for the Moffat Project, which includes expansion of Gross Reservoir, located approximately 35 miles northwest of Denver and 6 miles southwest of the City of Boulder in Boulder County. The purpose of the Moffat Project is to develop 18,000 acre-feet per year of new, annual firm yield to the Moffat Water Treatment Plant (WTP) and raw water customers upstream of the Moffat WTP pursuant to the Board of Water Commissioners' commitment to its customers. Denver Water's need for the Moffat Project is to address two major issues: 1) timeliness - the overall near-term water supply shortage; and 2) location - the imbalance in water storage and supply between the North and South systems.

Denver Water proposes to enlarge the existing 41,811 acre-foot Gross Reservoir by 72,000 acre-feet, for its use; a storage capacity of 113,811 acre-feet. This would be accomplished by raising

the existing, concrete gravity arch dam by 125 feet, from 340 feet to 465 feet in height. Denver Water would also create an additional 5,000 acre-feet of storage in the reservoir for Boulder and Lafayette. To accommodate this additional storage, Denver Water would raise the dam an additional 6 feet beyond the proposed 125-foot rise, for a total dam height of 471 feet. The surface area of Gross Reservoir would expand from about 418 acres to 842 acres, which would inundate approximately 400 acres of surrounding shoreline. The grand total of water storage in Gross Reservoir under the proposed action would be 118,811 acre-feet (113,811 + 5,000). However, none of Denver Water's existing or future water supply would be stored in the 5,000- acre-foot environmental pool. ESA compliance for the additional 5,000 acre-feet of storage will be addressed separately as mentioned above.

Using existing collection infrastructure, water from the Fraser River, Williams Fork River, and South Boulder Creek would be diverted and delivered during average to wet years via the Moffat Tunnel and South Boulder Creek to Gross Reservoir. In order to provide the 18,000 acre-feet per year of new firm yield to meet an average annual demand of 363,000 acre-feet per year (345,000 acre-feet from full use of the existing system plus the Project), the additional 72,000 acre-feet of storage capacity at Gross Reservoir is necessary. Existing facilities, including the South Boulder Diversion Canal and Conduits 16/22, would be used to deliver water from the enlarged Gross Reservoir to the Moffat WTP and raw water customers. To meet future demands, in most years, Denver Water would continue to rely on supplies from its entire integrated collections system. In a drought or emergency, Denver Water would rely on the additional water it would have previously stored in the Moffat Collection System to provide the additional 18,000 acre-feet of yield.

The Moffat Project would result in a combination of existing and new depletions to the Platte River system. These depletions are associated with changes in operation of Denver Water's *entire* water collection system, including Gross Reservoir and numerous other east slope reservoirs located throughout the South Platte River basin. The average annual diversions from the South Platte River at the demand level of 363,000 acre-feet per year would be 184,428 acre- feet. Total South Platte River diversions were calculated as the difference between total customer demand (deliveries of treated, raw, and non-potable water) and the amount supplied by Denver Water's Colorado River diversions.

The majority of Denver Water's South Platte River supplies are diverted from the South Platte at Strontia Springs Reservoir or downstream at the Conduit 20 intake in Waterton Canyon. Some water is also diverted from facilities on Bear Creek, South Boulder Creek, Ralston Creek, and Cherry Creek. Under the proposed action, total South Platte River diversions, including reservoir evaporative losses, associated with Denver Water's past, existing, and future demand levels since implementation of the PRRIP, would be 48,767 acre-feet per year. The Moffat Project would result in additional average annual diversions of 3,460 acre-feet from the South Platte River; this includes 2,879 acre-feet per year of new diversions and 581 acre-feet per year of additional reservoir evaporation. The amount of diverted water would be much greater than the amount of actual depletions from the South Platte River basin because much of the additional diverted water would return to the river via return flows from wastewater treatment plants and lawn irrigation.

This consultation also addresses Denver Water's entire system of water diversions from the Colorado River basin. Under the Moffat Project, Denver Water's total average annual depletion from the Colorado River would be 188,497 acre-feet. The Colorado River system depletions would include 137,833 acre-feet of average annual depletions that occurred before the initiation of the Upper Colorado River Recovery Program and previous consultations addressing 33,288 acre-feet per year. Therefore, the total of 188,497 acre-feet includes 17,376 acre-feet of new depletions and 171,121 acre-feet (137,833 + 33,288) of historic depletions that have already been consulted on. Increased diversions would decrease flows in the Colorado River primarily during the summer months, especially June and July.

PLATTE RIVER

BACKGROUND

On June 16, 2006, the Service issued a programmatic biological opinion (PBO) for the PRRIP and water-related activities^a affecting flow volume and timing in the central and lower reaches of the Platte River in Nebraska. The action area for the PBO included the Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence.

The Federal action addressed by the PBO included the following:

- 1) funding and implementation of the PRRIP for 13 years, the anticipated first stage of the PRRIP; and
- 2) continued operation of existing and certain new water-related activities^b including, but not limited to, Bureau of Reclamation (Reclamation) and Service projects that are (or may become) dependent on the PRRIP for ESA compliance during the first 13-year stage of the PRRIP for their effects on the target species^c, whooping crane critical habitat, and other federally listed species^d that rely on central and lower Platte River habitats.

The PBO established a two-tiered consultation process for future Federal actions on existing and new water-related activities subject to section 7(a)(2) of the ESA, with issuance of the PBO being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations covered

^a The term "water-related activities" means activities and aspects of activities which (1) occur in the Platte River basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a "water related activity" to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of "water related activities" do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing.

^b "Existing water related activities" include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. "New water-related activities" include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

^c The "target species" are the endangered whooping crane, the interior least tern, the pallid sturgeon, and the threatened northern Great Plains population of the piping plover.

^d Other listed species present in the central and lower Platte River include the western prairie fringed orchid and American burying beetle.

by the PBO. Under this tiered consultation process, the Service will produce tiered biological opinions when it is determined that future federal actions are "likely to adversely affect" federally listed species and/or designated critical habitat in the PRRIP action area and the Project is covered by the PBO. If necessary, the biological opinions will also consider potential effects to other listed species and critical habitat affected by the Federal action that were not within the scope of the Tier 1 PBO (e.g., direct or indirect effects to listed species occurring outside of the PRRIP action area).

Although the water depletive effects of this Federal action to central and lower Platte River species have been addressed in the PBO, when "no effect" or "may affect but not likely to adversely affect" determinations are made on a site-specific basis for the target species in Nebraska, the Service will review these determinations and provide written concurrence where appropriate. Upon receipt of written concurrence, section 7(a)(2) consultation will be considered completed for those Federal actions.

Water-related activities requiring Federal approval will be reviewed by the Service to determine if: (1) those activities comply with the definition of existing water-related activities and/or (2) proposed new water-related activities are covered by the applicable states or the Federal depletions plan. The Service has determined that the Project meets the above criteria and, therefore, this Tier 2 biological opinion regarding the effects of the Project on the target species, whooping crane critical habitat, and the western prairie fringed orchid in the central and lower Platte River can tier from the June 16, 2006, PBO.

CONSULTATION HISTORY

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service's determination of the effects of the Federal action analyzed in the PBO.

The Service determined in the Tier 1 PBO that the Federal action, including the continued operation of existing and certain new water-related activities, may adversely affect but would not likely jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, western prairie fringed orchid, and bald eagle (*Haliaeetus leucocephalus*) in the central and lower Platte River. Further, the Service determined that the Federal action, including the continued operation of existing and certain new water-related activities, was not likely to destroy or adversely modify designated critical habitat for the whooping crane. The bald eagle was subsequently removed from the Federal endangered species list on August 8, 2007. Bald eagles continue to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. For more information on bald eagles, see the Service's webpage at: <http://www.fws.gov/midwest/eagle/recovery/biologue.html>

The Service also determined that the PBO Federal action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal action,

including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered American burying beetle.

The effects of the continued operation of existing and certain new water-related activities on the remaining species and critical habitats listed in Table II-1 of the PBO were beyond the scope of the PBO and were not considered.

SCOPE OF THE TIER 2 BIOLOGICAL OPINION

The proposed Project is a component of “the continued operation of existing and certain new water-related activities” needing a Federal action evaluated in the Tier 1 PBO, and flow-related effects of the Federal action are consistent with the scope and the determination of effects in the June 16, 2006 PBO. Because Denver Water has elected to participate in the PRRIP, ESA compliance for flow-related effects to federally listed endangered and threatened species and designated critical habitat from the Project is provided to the extent described in the Tier 1 PBO.

This biological opinion applies to the Project's effects to listed endangered and threatened species and designated critical habitat as described in the PBO for the first thirteen years of the PRRIP (i.e., the anticipated duration of the first PRRIP increment).

STATUS OF THE SPECIES/CRITICAL HABITAT

Species descriptions, life histories, population dynamics, status and distributions are fully described in the PBO on pages 76-156 for the whooping crane, interior least tern, piping plover, pallid sturgeon and western prairie fringed orchid, and whooping crane critical habitat and are hereby incorporated by reference. Climate change is not explicitly identified in the Tier 1 PBO as a potential threat, except for whooping crane and whooping crane critical habitat.

The terms “climate” and “climate change” are defined by the Intergovernmental Panel on Climate Change (IPCC). “Climate” refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term “climate change” thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8-14, 18-19).

Changes in temperature and/or precipitation patterns will influence the status of the Platte River system. These changes may contribute to threats that have already been identified and discussed for interior least tern, piping plover, pallid sturgeon and western prairie fringed orchid in the Tier 1 PBO.

Since issuance of the Service's PBO, there have been no substantial changes in the status of the target species/critical habitat other than the bald eagle delisting previously mentioned.

ENVIRONMENTAL BASELINE

The Environmental Baseline sections for the Platte River and for the whooping crane, interior least tern, piping plover, pallid sturgeon and western prairie fringed orchid, and whooping crane critical habitat are described on pages 157 to 219 of the Tier 1 PBO, and are hereby incorporated by reference. The status of the Platte River system includes a discussion on the impact of climate change. The Tier 1 BO concluded that although climate change has been identified as a contributor to the baseline, human activities are the biggest influence on the baseline. For the duration of this consultation (13 years), human activities are expected to continue to be the major influence on the functionality of the action area for listed species and critical habitat.

Since issuance of the Tier 1 PBO, there have been no substantial changes in the status of the target species/critical habitat in the action area other than the bald eagle delisting.

EFFECTS OF THE ACTION

The Tier 1 BO did not address climate change in the Effects of the Action section, as human activities (upstream storage, diversion, and distribution of the river's flow) are the most important drivers of change that adversely affect species habitat in the action area. Since issuance of the Tier 1 PBO, our analyses under the ESA include consideration of ongoing and projected changes in climate. In our analyses, we used our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change. Actions that are undertaken to improve the river ecology and habitats for listed species not only address human activities, but also contribute to listed species and whooping crane critical habitat resiliency to climate change.

Based on our analysis of the information provided in your revised BA for the Project, the Service concludes that the proposed Federal action will result in a combination of existing and new depletions to the Platte River system above the Loup River confluence. These depletions are associated with changes in operation of Denver Water's *entire* water collection system. The total average annual South Platte River diversions at the demand level of 363,000 acre-feet per year would be 202,880 acre-feet; 184,428 acre-feet per year of river diversions and 18,452 acre-feet per year of evaporation from Denver Water's east slope reservoirs. The proposed Moffat Project would result in additional average annual diversions of 3,460 acre-feet from the South Platte River. This includes 2,879 acre-feet per year of new diversions and 581 acre-feet per year of additional reservoir evaporation. Overall, average annual South Platte River diversions and reservoir evaporation associated with Denver Water's past, existing, and future demand levels since implementation of the PRRIP would be 48,767 acre-feet. To meet the average annual demand of 363,000 acre-feet, Denver Water would use its entire South Platte collection system and associated water rights. The water is decreed for municipal and industrial purposes through multiple water right decrees (see Enclosure 1, Denver Water Tabulation of Water Rights).

Under the proposed action, the total average annual depletions to the South Platte River associated with an average annual demand of 363,000 acre-feet would be 113,969 acre-feet; 90,517 acre-feet per year from the South Platte, 18,452 acre-feet per year of evaporative losses from the east slope reservoirs, and 5,000 acre-feet per year from the "5K water deliveries", which is the amount of reusable water that Denver Water leases for municipal purposes with the Denver metropolitan area (the South Adams County Water and Sanitation District has contracted for this water). The average annual increase in South Platte River depletions associated with the Moffat Project would be 1,413 acre-feet; however, if evaporative losses are included, the amount would increase to 1,994 acre-feet per year. Overall, average annual depletions to the South Platte associated with Denver Water's past, existing, and future demand levels since implementation of the PRRIP would be 30,111 acre-feet.

As both an existing and new water-related activity, we have determined that the flow-related adverse effects of the Project are consistent with those evaluated in the Tier 1 PBO for the whooping crane, interior least tern, piping plover, pallid sturgeon, western prairie fringed orchid, and whooping crane critical habitat, and these effects on flows are being addressed in conformance with the Colorado plan for future depletions of the PRRIP.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, local, or private (non-Federal) actions that are reasonably certain to occur in the action area considered in this biological opinion. A non-Federal action is "reasonably certain" to occur if the action requires the approval of a state or local resource or land-control agency, such agencies have approved the action, and the Project is ready to proceed. Other indicators which may also support such a "reasonably certain to occur" determination include whether: a) the Project sponsors provide assurance that the action will proceed; b) contracting has been initiated; c) state or local planning agencies indicate that grant of authority for the action is imminent; or d) where historic data have demonstrated an established trend, that trend may be forecast into the future as reasonably certain to occur. These indicators must show more than the possibility that the non-Federal project will occur; they must demonstrate with reasonable certainty that it will occur. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA and would be consulted on at a later time.

Cumulative effects are described on pages 194 to 300 of the Tier 1 PBO, and are hereby incorporated by reference. Since the Tier 1 PBO was issued, there have been no substantial changes in the status of cumulative effects.

CONCLUSION

The Service concludes that the proposed Moffat Collection System Project is consistent with the Tier 1 PBO for effects to listed species and critical habitat addressed in the Tier 1 PBO. After reviewing site specific information, including: 1) the scope of the Federal action, 2) the environmental baseline, 3) the status of the whooping crane, interior least tern, piping plover, pallid sturgeon, and the western prairie fringed orchid in the central and lower Platte River and

their potential occurrence within the Project area, as well as whooping crane critical habitat, 4) the effects of the Project, and 5) any cumulative effects, it is the Service's biological opinion that the Project, as described, is not likely to jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern great plains population of the piping plover, or western prairie fringed orchid in the central and lower Platte River. The Federal action is also not likely to destroy or adversely modify designated critical habitat for the whooping crane.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibits the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct, and applies to individual members of a listed species. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Sections 7(b)(4) and 7(o)(2) of the ESA do not apply to the incidental take of federally listed plant species (e.g., Colorado butterfly plant (*Gaura neomexicana coloradensis*), Ute ladies'-tresses orchid, and western prairie fringed orchid). However, limited protection of listed plants from take is provided to the extent that ESA prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on non-Federal areas in violation of state law or regulation or in the course of any violation of a state criminal trespass law. Such laws vary from state to state.

The Department of the Interior, acting through the Service and Reclamation, is implementing all pertinent reasonable and prudent measures and implementing terms and conditions stipulated in the Tier 1 PBO incidental take statement (pages 309-326 of the PBO) which will minimize the anticipated incidental take of federally listed species. In instances where the amount or extent of incidental take outlined in the Tier 1 PBO is exceeded, or the amount or extent of incidental take for other listed species is exceeded, the specific PRRIP action(s) causing such take shall be subject to reinitiation expeditiously.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened

species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations are provided in the PBO (pages 328-329) and are hereby incorporated by reference.

REINITIATION AND CLOSING STATEMENT

Any person or entity undertaking a water-related activity that receives Federal funding or a Federal authorization and which relies on the PRRIP as a component of its ESA compliance in section 7 consultation must agree: (1) to the inclusion in its Federal funding or authorization documents of reopening authority, including reopening authority to accommodate reinitiation upon the circumstances described in section IV.E. of the program document, which addresses program termination; and (2) to request appropriate amendments from the Federal action agency as needed to conform its funding or authorization to any PRRIP adjustments negotiated among the three states and the Department of the Interior, including specifically new requirements, if any, at the end of the first PRRIP increment and any subsequent PRRIP increments. The Service believes that the PRRIP should not provide ESA compliance for any water-related activity for which the funding or authorization document does not conform to any PRRIP adjustments (Program Document, section VI).

Reinitiation of consultation over the Moffat Collection System Project will not be required at the end of the first 13-years of the PRRIP provided a subsequent program increment or first increment program extension is adopted pursuant to appropriate ESA and NEPA compliance procedures, and, for a subsequent increment, the effects of the Project are covered under a Tier 1 PBO for that increment addressing continued operation of previously consulted-on water-related activities.

COLORADO RIVER

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative to avoid jeopardy to the endangered fishes by depletions from the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On December 20, 1999, the Service issued the final programmatic biological opinion for Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program actions in the Upper Colorado River above the Confluence with the Gunnison River (this document is available for viewing at the following internet address: coloradoriverrecovery.org/). The Service has determined that projects that fit under the umbrella of the Colorado River PBO would avoid the likelihood of jeopardy and/or adverse modification of

critical habitat for depletion impacts. The Service has determined that if the subject Project meets the following criteria, then it fits under the umbrella of the Colorado River PBO.

1. The Project depletes water from the Colorado River above the confluence with the Gunnison River.
2. The applicant signs the Recovery Agreement. The Service and Denver Water signed a Recovery Agreement on February 14, 2000 (copy enclosed). This Recovery Agreement was signed for a consultation with the Federal Energy Regulatory Commission on the relicense of the Gross Reservoir Hydroelectric Project, biological opinion number ES/GJ-6-C0-00-F-024, dated October 12, 2000.
3. The Moffat Collection System Project will deplete an additional 17,376 acre-feet of water from the upper Colorado River basin. In order to rely on the Recovery Program to offset the subject depletions, the Project sponsors will make a one-time monetary contribution for water depletions greater than 100 acre-feet to help fund their share of the costs of recovery actions. The one-time payment is calculated by multiplying the Project's average annual new depletion (17,376 acre-feet) by the water user's share of Recovery Program costs (the charge) in effect at the time payment is made. For Fiscal Year 2014 (October 1, 2013, to September 30, 2014), the charge is \$20.24 per acre-foot for the average annual depletion which equals a total contribution of \$351,690.24 for this Project's share of the Recovery Program costs. This amount will be adjusted annually for inflation on October 1 of each year based on the Consumer Price Index. Ten percent of the total contribution (\$35,169.02), or total payment, will be provided to the Service's designated agent, the National Fish and Wildlife Foundation (Foundation), at the time of issuance of the Federal approvals from the Corps. The balance will be due at the time the construction commences. The payment will be included by the Corps as a permit stipulation. The funds will be used for acquisition of water rights (or directly-related activities) to meet the in stream flow needs of the endangered fishes; or to support other recovery activities for the endangered fishes described in the RIPRAP. All payments should be made to the Foundation.

National Fish and Wildlife Foundation
Donna McNamara, Finance Department
1133 15th Street, NW, Suite 1100
Washington, D.C. 20005

Each payment is to be accompanied by a cover letter that identifies the project and biological opinion number ES/GJ-6-C0-99-F-033-CP126 that requires the payment, the amount of payment enclosed, and check number. A copy of the cover letter and a copy of the payment check shall be sent to the Service office issuing this biological opinion. The cover letter also shall identify the name and address of the payor, the name and address of the Federal agency responsible for authorizing the project, and the address of the Service office conducting the section 7 consultation. This information will be used by the Foundation to notify the payor, the lead Federal agency, and the Service that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

4. The Service requests that the Corps retain discretionary Federal authority for the subject Project in case reinitiation of section 7 consultation is required.

REINITIATION NOTICE

This concludes formal consultation on the subject action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and under the following conditions:

1. The amount or extent of take specified in the incidental take statement for the Colorado River PBO is exceeded. The Service has determined that no incidental take, including harm, is anticipated to occur as a result of the depletions contemplated in this opinion because of the implementation of recovery actions. The implementation of the recovery actions contained in the Colorado River PBO will further decrease the likelihood of any take caused by depletion impacts.

2. New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in the Colorado River PBO. In preparing the Colorado River PBO, the Service describes the positive and negative effects of the action it anticipates and considered in the section of the opinion entitled "Effects of the Action." New information would include, but is not limited to, not achieving a "positive response" or a significant decline in population, as described in Appendix D of the Colorado River PBO. Significant decline shall mean a decline in excess of normal variations in population (Appendix D). The current population estimate of adult Colorado pikeminnow in the Colorado River is 600 individuals, with a confidence interval of ± 250 . Therefore, with the criteria established in Appendix D, a negative population response would trigger reinitiation if the population declined to 350 adults. The Recovery Program has developed recovery goals for the four endangered fishes. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. The Service retains the authority to determine whether a significant decline in population has occurred, but will consult with the Recovery Program's Biology Committee prior to making its determination. In the event of a significant population decline, the Service is to first rely on the Recovery Program to take actions to correct the decline. If nonflow recovery actions have not been implemented, the Service will assess the impacts of not completing these actions prior to reexamining any flow related issues.

New information would also include the lack of a positive population response by the year 2015 or when new depletions reach 50,000 acre-feet/year. According to the criteria outlined in Appendix D of the Colorado River PBO, a positive response would require the adult Colorado pikeminnow population estimate to be 1,100 individuals (± 250) in the Colorado River (Rifle, Colorado to the confluence with the Green River). When the population estimate increases above 1,100, a new population baseline is established at the higher population level.

3. The Recovery Action Plan actions listed as part of the proposed action in the Colorado River PBO are not implemented within the required time frames. This would be considered a change in the action subject to consultation; section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is required if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery Program, as explained in the description of the proposed action. In 2003 and every 2 years thereafter, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions to determine timely compliance with applicable schedules.

4. The Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under the Colorado River PBO may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the Colorado River PBO as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are already included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

For purposes of any future reinitiation of consultation, depletions have been divided into two categories:

CATEGORY 1

A. Existing depletions, both Federal and non-Federal as described in the project description, from the Upper Colorado River Basin above the confluence with the Gunnison River that had actually occurred on or before September 30, 1995 (average annual depletion of approximately 1 million acre-feet/year);

B. Depletions associated with the total 154,645 acre-feet/year volume of Green Mountain Reservoir, including power pool (which includes but is not limited to all of the 20,000 acre-feet contract pool and historic user's pool), the Colorado Big-Thompson replacement pool; and

C. Depletions associated with Ruedi Reservoir including Round I sales of 7,850 acre-feet, Round II sales of 6,135 acre-feet/year as discussed in the Service's biological opinion to Reclamation dated May 26, 1995, and as amended on January 6, 1999, and the Fryingpan Arkansas Project

replacement pool as governed by the operating principles for Ruedi Reservoir but excluding 21,650 acre-feet of the marketable yield.

Category 1 depletions shall remain as Category 1 depletions regardless of any subsequent change, exchange, or abandonment of the water rights resulting in such depletions. Category 1 depletions associated with existing facilities may be transferred to other facilities and remain in Category 1 so long as there is no increase in the amount of total depletions attributable to existing depletions. However, section 7 consultation is still required for Category 1 depletion projects when a new Federal action occurs which may affect endangered species except as provided by the criteria established for individual consultation under the umbrella of the Colorado River PBO. Reinitiation of this consultation will be required if the water users fail to provide 10,825 acre-feet/year on a permanent basis.

CATEGORY 2

Category 2 is defined as all new depletions up to 120,000 acre-feet/year, this includes all depletions not included in Category 1 that occur after 1995 regardless of whether section 7 consultation has been completed. This category is further divided into two 60,000 acre-feet/year blocks of depletions.

The recovery actions are intended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat and to result in a positive response as described in Appendix D of the Colorado River PBO for both 60,000 acre-feet blocks of depletions in Category 2. However, prior to depletions occurring in the second block, the Service will review the Recovery Program's progress and adequacy of the species response to the Recovery Action Plan actions. According to the criteria outlined in Appendix D, a positive response would require the adult Colorado pikeminnow population estimate to be maintained at approximately 1,100 individuals in the Colorado River (Rifle, Colorado to the confluence with the Green River), unless the criteria in Appendix D is changed because of new information. If the adult Colorado pikeminnow population is maintained at approximately 1,100 adults or whatever is determined to be the recovery goal in the Colorado River, a new population baseline would be established to determine a positive or negative population response.

When population estimates for wild adult humpback chub are finalized, they will also be used to determine population response. As outlined in Appendix D, Colorado pikeminnow and humpback chub population estimates will serve as surrogates for razorback sucker and bonytail to assess the status of their populations for 10 years. Recovery goals for all four species were completed August 1, 2002. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. However, short of reaching a specific recovery goal, trends in certain population Indices provide an interim assessment of a species' progress toward recovery. This review will begin when actual depletion levels from the first depletion block reach 50,000 acre-feet/year or the year 2015, whichever comes first.

Calculation of actual depletions is to be accomplished using Cameo gage records and State Division of Water Resources data (Appendix B of the Colorado River PBO). The review will

include a determination if all the recovery actions have been satisfactorily completed, that all ongoing recovery actions are continuing, and the status of the endangered fish species. If it is determined that the recovery actions have all been completed and the status of all four endangered fish species has improved (based on criteria in Appendix D), then the Service intends that the Colorado River PBO would remain in effect for new depletions up to 120,000 acre-feet/year (total of both 60,000 acre-feet blocks of Category 2 depletions).

Monitoring, as explained in Appendix D, will be ongoing to determine if a population estimate of 1,100 (\pm one confidence interval) adult Colorado pikeminnow is maintained. If it is not maintained, this would be considered new information and section 7 would have to be reinitiated. Population baselines will be adjusted as population estimates change. If the adult Colorado pikeminnow population estimates increase, a new population baseline will be established to determine a positive or negative population response. If the population estimate for Colorado pikeminnow in the year 2015 is greater than 1,100 adults, then the higher number will be used to establish a new population baseline. These numeric values may be revised as new information becomes available. Revisions will be made to Appendix D as needed.

If the 50,000 acre-foot or 2015 review indicates that either the recovery actions have not been completed or the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Recovery Program to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions associated with the second 60,000 acre-feet/year block. Any additional measures will be evaluated every 5 years. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required for the second 60,000 acre-feet/year, consultation on projects with a Federal nexus may be reinitiated in accordance with Endangered Species Act regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the criteria in Appendix D or if any positive response achieved prior to the 50,000 acre-foot or the year 2015 is not maintained. Once a positive response is achieved, failure to maintain it will be considered a negative response.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. The Service will reinitiate consultation with individual projects only if the Recovery Program does not implement recovery actions to improve the status of the listed fish species. The Service will reinitiate consultation first on Category 2 projects and second on Category 1 projects. The Service will only reinitiate consultations on Category 1 depletions if Category 2 depletion impacts are offset to the full extent of the capability of the covered projects as determined by the Service and the likelihood of jeopardy to the listed fishes and/or adverse modification of critical habitat still cannot be avoided. The Service intends to reinitiate consultations simultaneously on all depletions within the applicable category.

This concludes formal consultation on the actions outlined in the August 14, 2012, and August 14, 2013, requests from the Corps. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the specific action(s) causing such take shall be subject to reinitiation expeditiously.

Requests for reinitiation, or questions regarding reinitiation should be directed to the Service's Colorado Field Office at the above address. If you have any questions regarding this consultation, please contact this office at (303) 236-4773.

Sincerely,

A handwritten signature in dark ink, appearing to read "Susan C. Linner", written in a cursive style.

Susan C. Linner
Colorado Field Supervisor

Enclosure 1: Denver Water Tabulation of Water Rights

Enclosure 2: [Colorado River] Recovery Agreement

cc: FWS/WTR, Denver (T. Econopouly)(w/Enclosure 1) FWS/ES, Nebraska (M. Rabbe)
FWS/ES, Grand Junction (w/Enclosure 2)
FWS/UCREFRP, Denver (w/Enclosure 2)
FWS/ES, Lakewood (S. Vana-Miller)(w/Enclosure 1)

LITERATURE CITED

IPCC. 2007. *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, Pachauri, R.K., and A. Reisinger (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Platte River Recovery Implementation Program document. 2006.

U.S. Department of the Interior. 2006. Platte River Recovery Implementation Program Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2006. Biological opinion on the Platte River Recovery Implementation Program.

Enclosure 1

Denver Water Tabulation of Water Rights

Division/District and Name of Structure or Water Right Name	Source	Appropriation Date	Decree Date	Amount	Case No.
Water Division No. 1					
Lawn Irrigation Return Flow Project	Reusable return flow	N/A	5/15/2012	200 cfs	2004CW121
District No. 2 Storage Rights					
Denver Water/South Adams County Reservoir Water Supply Project					
North Reservoir Complex - Fill and refill	South Platte River	12/28/2001	8/8/2011	17,747 AF	2001CW286
South Reservoir Complex - Fill and refill	South Platte River	12/28/2001	8/8/2011	2,400 AF	2001CW286
South Reservoir Complex - Enlargement	South Platte River	12/29/2009	Pending	1,129 AF	2009CW264
Lupton Lakes Storage Complex - Fill and refill	South Platte River	7/12/2006	Pending	11,400 AF	2007CW322
District No. 2 Direct Flow Rights					
DIA Wetlands	South Platte River trib flow	4/1/2000	12/27/2006	22.16 AF	2003CW129
DIA Wetlands	Box Elder Creek	7/1/2000	1/14/2004	16.32 AF	2002CW386
Gravel Pit Exchange	South Platte River	8/31/2009	Pending	80 cfs	2009CW123
Recycling Plant Intake	South Platte River	12/28/2001	12/6/2011	70.0 cfs	2001CW287
Recycling Plant Intake exch. and subs.	South Platte River	12/28/2001	12/6/2011	70.0 cfs	2001CW287
SK Direct Flow Right	South Platte River	12/28/2001	10/25/2011	5,000 AF	2001CW285
Farmers and Gardeners Ditch	South Platte River	03/15/1863	9/29/2012	13.72 cfs x	2009CW84
1st Enlargement	South Platte River	04/01/1874	9/29/2012	10.28 cfs x	2009CW84
District No. 6 Storage Rights					
Gross Reservoir					
Storage Right	South Boulder Creek	5/10/1945	9/28/1953	113,078 AF _D	C.A.12111
Refill Right	South Boulder Creek	5/10/1945	9/28/1953	113,078 AF _D	C.A.12111
Ralston Creek Reservoir					
Priority 31 Storage Right	South Boulder Creek	1/1/1930	9/28/1953	11,000 AF	C.A.12111
Priority 31 Storage Right	South Boulder Creek	10/31/1932	9/28/1953	1,758 AF	C.A.12111
District No. 6 Direct Flow Rights					
South Boulder Diversion Conduit	South Boulder Creek	1/1/1930	9/28/1953	461 cfs	C.A.12111
District No. 7 Storage Rights					
Ralston Creek Reservoir	Ralston Creek	1/1/1930	10/18/1978	7,394 AF	W-7561
Ralston Creek Reservoir	Ralston Creek	1/1/1930	10/18/1978	3,382 AF _H	W-7561
Long Lake No. 1 (Upper)	Ralston Creek	05/29/1873	10/04/1884	890 AF	Not given
Long Lake No. 1 (Upper)	Ralston Creek	6/6/1909	5/13/1936	557 AF	C.A. 60052
Long Lake No. 1 (Upper)	Ralston Creek	6/6/1909	5/13/1936	72 AF _H	C.A. 60052
Long Lake No. 2 (Lower)	Ralston Creek	6/6/1909	5/13/1936	292 AF	C.A. 60052
District No. 7 Direct Flow Rights					
Ralston Creek Intake	Ralston Creek	1/1/1930	10/18/1978	212 cfs	W-7561
Ralston Creek Intake	Ralston Creek	1/1/1930	10/18/1978	148 cfs _H	W-7561
District No. 8 Storage Rights					
Chatfield Reservoir					
Storage	South Platte River	12/28/1977	8/29/1994	27,428 AF _D	W-8783-77
Exchange	South Platte River	12/28/1977	8/29/1994	27,428 AF _D	W-8783-77

Division/District and Name of Structure or Water Right Name	Source	Appropriation Date	Decree Date	Amount	Case No.
Marston Reservoir	South Platte River	4/1/1911	6/16/1930	19,795 AF	C.A. 807
Platte Canyon Reservoir	South Platte River	9/5/1902	6/16/1930	905 AF	C.A. 807
Strontia Springs Reservoir	South Platte River	3/21/1962	12/19/1983	7,700 AF	80CW406
Refill Right	South Platte River	3/21/1962	2/28/1990	7,864 AF	87CW116
District No. 8 Direct Flow Rights					
Brown Ditch	South Platte River	11/30/1862	4/17/1990	8.75 cfs	86CW014
Cherry Creek Park Well No. 1	Cherry Creek Alluvium	7/25/1989	10/24/2006	98 gpm	89CW198
Cherry Creek Galleries (Well O)	Cherry Creek	05/01/1887	6/16/1930	14.02 cfs	C.A. 807
Cherry Creek Galleries (Well O) Aug. Plan	Cherry Creek	05/01/1887	10/5/2007	2.45 cfs	2003CW234
Exchange within Denver Water System	South Platte River	7/4/1921	5/18/1972	3,000 cfs DEJ	C.A. 3635
Four Mile House Well No. 1	Cherry Creek Alluvium	8/31/1948	8/29/1983	0.44 cfs	83CW095
Snell Ditch	Cherry Creek Alluvium	9/30/1871	10/30/1991	31 gpm	85CW325
Success Ditch	Cherry Creek Alluvium	4/30/1872	10/30/1991	169 gpm	85CW325
Garland Park Well No. 1	Cherry Creek Alluvium	9/20/1991	3/7/2007	525 gpm	93CW110
Success Ditch	Cherry Creek Alluvium	4/30/1872	3/7/2007	525 gpm	85CW325
Glendale Wells No. 1, 2, 3, and 4	Cherry Creek Alluvium	3/6/1959	5/18/1972	8 cfs	C.A. 3635
Glendale Well No. 5	Cherry Creek Alluvium	7/15/1926	5/18/1972	1.1 cfs	C.A. 3635
Glendale LFH-1	Non-trib. Laramie Fox-Hills Aquifer	N/A	2/28/1990	141 AF	88CW149
Glendale Well UA-1	Non-trib. Upper Arapahoe Aquifer	N/A	8/23/1991	32.41 AF	90CW117
Glendale Well LA-1	Non-trib. Lower Arapahoe Aquifer	N/A	8/23/1991	17.34 AF	90CW117
Intake Rights - Divertible at Conduit No. 20 Intake and Strontia Springs Reservoir/Conduit No. 26 (Foothills Tunnel) and other points					
Transfer from Platte Canyon Ditch	South Platte River	07/30/1861	1/16/1984	4.70 cfs	80CW039
Transfer from Platte Canyon Ditch	South Platte River	12/30/1863	1/16/1984	24.50 cfs	80CW039
Transfer from Platte Canyon Ditch	South Platte River	12/30/1864	1/16/1984	17.30 cfs	80CW039
Transfer from Borden Ditch	South Platte River	05/01/1866	1/16/1984	8.70 cfs	80CW039
City Right	South Platte River	12/20/1870	1/16/1984	3.00 cfs	80CW039
City Right	South Platte River	12/31/1874	1/16/1984	3.78 cfs	80CW039
Transfer from Weed Ditch	South Platte River	05/01/1875	1/16/1984	2.31 cfs	80CW039
City Right	South Platte River	09/10/1878	1/16/1984	13.22 cfs	80CW039
Transfer from Weed Ditch	South Platte River	06/01/1879	1/16/1984	3.65 cfs	80CW039
City Right	South Platte River	06/30/1880	1/16/1984	10.00 cfs	80CW039
Transfer from Love and Raynor Ditch	South Platte River	05/08/1881	1/16/1984	1.71 cfs	80CW039
Transfer from Little Channel Ditch	South Platte River	05/01/1882	1/16/1984	0.48 cfs	80CW039
Transfer from Island Ditch	South Platte River	05/20/1885	1/16/1984	2.04 cfs	80CW039
City Right	South Platte River	10/01/1889	1/16/1984	12.38 cfs	80CW039
City Right	South Platte River	09/01/1892	1/16/1984	25.33 cfs	80CW039
City Right	South Platte River	05/01/1899	1/16/1984	38.08 cfs	80CW039
City Right	South Platte River	12/6/1910	1/16/1984	42.72 cfs	80CW039
Foothills Tunnel and Conduit No. 26	South Platte River	3/21/1962	12/19/1983	774 cfs DJ	80CW408
John F. Kennedy Golf Course Wells and Plan for Augmentation					
John F. Kennedy Well 1 (51765-F)	Cherry Creek	1/13/1961	6/24/1985	1.23 cfs	81CW404
John F. Kennedy Well 2 (51764-F)	Cherry Creek	2/13/1961	6/24/1985	1.53 cfs	81CW404
John F. Kennedy Well 3 (42580-F)	Cherry Creek	3/27/1990	12/4/2006	700 gpm	93CW033
JFK Augmentation Plan	Cherry Creek	1/13/1961	6/20/1986	535 AF	81CW405
JFK Golf Course Expansion	Cherry Creek	3/27/1990	12/4/2006	571 AF	93CW033

Division/District and Name of Structure or Water Right Name	Source	Appropriation Date	Decree Date	Amount	Case No.
Last Chance Ditch No. 2					
Priority No. 14	South Platte River	12/30/1863	2/24/1993	1.74 cfs	92CW014
Priority No. 19	South Platte River	12/30/1865	2/24/1993	0.2 cfs	92CW014
Priority No. 39	South Platte River	03/03/1868	2/24/1993	6.54 cfs	92CW014
Nevada Ditch (Excludes amounts diverted at Farnell Lane Wells)					
Priority No. 4	South Platte River	08/30/1861	8/17/1992	13.06 cfs	90CW172
Priority No. 10	South Platte River	12/30/1865	8/17/1992	16.0 cfs	90CW172
Overland Golf Course Pumping Plant and Plan for Augmentation					
Epperson Ditch	South Platte River	05/01/1860	4/26/1993	0.34 cfs	91CW030
Overland Golf Course Pumping Plant	South Platte River	5/9/1958	2/17/1993	2.25 cfs	91CW029
Plan for Augmentation	South Platte River		5/24/1993	2.25 cfs	91CW028
District No. 9 Storage Rights					
Harriman Reservoir Priority No 1 Original Cons.	Bear & Turkey Creeks	05/01/1873	02/04/1884	18.09 cfs	C.A. 6832
Harriman Reservoir Priority No 2 1st Enlargement	Bear & Turkey Creeks	04/01/1875	02/04/1884	37.58 cfs	C.A. 6832
Miraton Reservoir	Bear Creek	08/15/1892	9/24/1935	19,795 AF	C.A. 91471
Soda Lakes Reservoirs					
Priority No. 5 (Domestic)	Bear Creek	02/11/1893	9/24/1935	598 AF	C.A. 91471
District No. 9 Direct Flow Rights					
Harriman (Arnett) Ditch					
Priority No. 21	Turkey Creek	04/15/1868	5/13/1998	5.7 cfs	91CW103
Priority No. 23	Bear Creek	03/16/1869	5/13/1998	4.21 cfs	91CW103
Priority No. 25	Bear Creek	05/01/1871	5/13/1998	13.54 cfs	91CW103
Priority No. 30	Bear Creek	03/01/1882	5/13/1998	6.82 cfs	91CW103
Priority No. 67 Domestic (irrigation season)	Bear Creek	12/05/1889	9/24/1935	25.50 cfs	C.A. 91471
Priority No. 68 Domestic (non-irrigation season)	Bear Creek	12/05/1889	9/24/1935	148.35 cfs	C.A. 91471
Priority No. 69 Domestic (irrigation season)	Turkey Creek	02/01/1890	9/24/1935	4.805 cfs	C.A. 91471
Priority No. 70 Domestic (non-irrigation season)	Turkey Creek	02/01/1890	9/24/1935	29.97 cfs	C.A. 91471
Priority No. 77 Domestic (irrigation season)	Bear Creek	08/15/1892	9/24/1935	19.16 cfs	C.A. 91471
Priority No. 78 Domestic (irrigation season)	Turkey Creek	08/15/1892	9/24/1935	4.50 cfs	C.A. 91471
Priority No. 79 Domestic (non-irrigation season)	Bear Creek	08/15/1892	9/24/1935	76.65 cfs	C.A. 91471
Priority No. 80 Domestic (non-irrigation season)	Turkey Creek	08/15/1892	9/24/1935	18.03 cfs	C.A. 91471
Hodgson Ditch					
Priority No. 3	Bear Creek	06/01/1861	5/13/1998	1.55 cfs	91CW102
Priority No. 9	Bear Creek	05/31/1862	5/13/1998	0.39 cfs	91CW102
Pioneer-Union Ditch					
Priority No. 5	Bear Creek	12/10/1861	5/13/1998	4.98 cfs	91CW100
Priority No. 11	Bear Creek	09/01/1862	5/13/1998	3.26 cfs	91CW100
Priority No. 15	Bear Creek	03/15/1865	5/13/1998	10.09 cfs	91CW100
Robert Lewis is Ditch	Bear Creek	10/01/1865	5/13/1998	6.96 cfs	91CW105
Simonton Ditch	Bear Creek	12/25/1860	5/13/1998	19.67 cfs	91CW106
Warrior Ditch					
Priority No. 4	Bear Creek	12/01/1861	5/13/1998	4.46 cfs	91CW109
Priority No. 8	Turkey Creek	04/16/1862	5/13/1998	1.03 cfs	91CW109
Priority No. 14	Bear Creek	10/31/1864	5/13/1998	9.21 cfs	91CW109
Priority No. 16	Bear Creek	04/01/1865	5/13/1998	4.16 cfs	91CW109

Division/District and Name of Structure or Water Right Name	Source	Appropriation Date	Decree Date	Amount	Case No.
District No. 23 Storage Rights					
Antero Reservoir	South Fork South Platte River	10/8/1907	5/31/1913	85,564 AF	C.A. 1678
Antero Reservoir Refill Right	South Fork South Platte River	12/31/1929	3/24/1953	20,046 AF	C.A. 3286
Antero Reservoir Exchange Right	South Fork South Platte River	4/1/1935	3/24/1953	20,046 AF	C.A. 3286
Beven Mile Canon Reservoir	South Fork South Platte River	7/10/1926	3/24/1953	81,917 AF	C.A. 3286
1st Enlargement	South Fork South Platte River	10/7/1957	4/27/1972	15,862 AF	C.A. 3701
Refill Right	South Fork South Platte River	12/31/1929	3/24/1953	81,917 AF	C.A. 3286
Exchange Right	South Fork South Platte River	4/1/1935	3/24/1953	81,917 AF	C.A. 3286
Cheesman Reservoir	South Fork South Platte River	06/27/1889	5/22/1913	30,691 AF	C.A. 1636
1st Enlargement	South Fork South Platte River	09/24/1893	5/22/1913	48,373 AF	C.A. 1636
Refill Right	South Fork South Platte River	12/31/1929	3/24/1953	79,064 AF	C.A. 3286
Exchange Right	South Fork South Platte River	4/1/1935	3/24/1953	79,064 AF	C.A. 3286
District No. 23 Direct Flow Rights					
Beery Ditch	Four Mile Creek, South Platte R	06/15/1861	7/14/1976	13.0 cfs	W-7739-74
Four Mile No. 9 Ditch	Four Mile Creek, South Platte R.	06/01/1868	11/12/1982	7.00 cfs	80CW313
Water Division No. 5					
Exchange Rights from Williams Fork Reservoir to:					
Dillon Reservoir and Roberts Tunnel	Blue R, Snake R, Ten Mile Cr	6/24/1946	3/10/1952	252,678 AF	Cons. 2782, 5016, 5017
Dillon Reservoir and Roberts Tunnel	Blue R, Snake R, Ten Mile Cr	6/24/1946	5/30/1972	93,637 AF	C.A. 1430
Dillon Reservoir and Roberts Tunnel	Blue R, Snake R, Ten Mile Cr	6/24/1946	11/10/1992	96,822 AF	88CW382
Fraser River Diversion Project	Fraser River and tributaries	11/10/1935	11/5/1937	93,637 AF	C.A. 657
Williams Fork Diversion Project	Williams Fork River & tributaries	11/10/1935	11/5/1937	93,637 AF	C.A. 657
Cabin- Meadow Creek System	Cabin-Meadow Creek and tribs.	7/2/1932	10/12/1955	70 cfs/5,100 AF	Cons. 2782, 5016, 5017
District No. 36 Storage Rights					
Dillon Reservoir	Blue R, Snake R, Ten Mile Cr	6/24/1946	3/10/1952	252,678 AF	C.A. 1806
Refill Right	Blue R, Snake R, Ten Mile Cr	1/1/1985	8/23/1999	15,000 AF	87CW376
District No. 36 Direct Flow Rights					
Blue River Diversion Project	Blue R, Snake R, Ten Mile Cr	6/24/1946	3/10/1952	788 cfs	Cons. 2782, 5016, 5017
District No. 51 Storage Rights					
Williams Fork Reservoir	Williams Fork River	11/10/1935	11/5/1937	93,637 AF	C.A. 657
Williams Fork Reservoir	Williams Fork River	10/9/1956	5/30/1972	93,637 AF	C.A. 1430
Meadow Creek Reservoir	Meadow Creek	7/2/1932	11/5/1937	5,100 AF	C.A. 657
Meadow Cr Res - Moffat Tunnel Collection Sys.	Meadow Creek	8/30/1963	5/30/1972	5,100 AF	C.A. 1430
Wolford Mountain Reservoir	Muddy Creek	12/14/1987	12/20/1989	23,997 AF	87CW283
Enlargement	Muddy Creek	1/16/1995	12/31/1995	2,400 AF	95CW281
Substitution	Muddy Creek		3/5/1996	200 cfs	91CW252
Emergency Exchange	Muddy Creek	3/3/1987	3/5/1996	200 cfs	91CW252
District No. 51 Direct Flow Rights					
Fraser River Diversion Project	Fraser River & Tributaries	7/4/1921	11/5/1937	1280 cfs	C.A. 657

Division/District and Name of Structure or Water Right Name	Source	Appropriation Date	Decree Date	Amount	Case No.
Cabin - Meadow Creek System					
Hamilton- Cabin Creek Ditch	Fraser River Tributaries	7/2/1932	11/5/1937	70 cfs	C.A. 657
Extension and Enlargement Hamilton Ditch	Fraser River Tributaries	7/2/1932	11/5/1937	25 cfs	C.A. 657
Moffat Tunnel Collection System	Fraser River & Tributaries	8/30/1963	5/30/1972	100.0 cfs	C.A. 1430
Williams Fork Diversion Project	Williams Fork River & Tribs	7/4/1921	11/5/1937	245 cfs	C.A. 657
<p>NOTE: The information contained in this Attachment A is for descriptive purposes only, and is not intended to represent an interpretation, admission or modification of any of the water right decrees.</p> <p>A. Pending claim in Case No. 2006CW255 to make 654 cfs absolute.</p> <p>B. Pending claim in Case No. 2007CW031 to make 245 cfs absolute. Conditional water rights associated with the enlargement and extension of the Williams Fork Diversion Project will be developed cooperatively with West Slope Entities pursuant to Article I.C.3.</p> <p>C. Reuse of return flows generated by diversion and importation through the Moffat and Jones Pass Tunnels of this water right are subject to the ruling in Case No. 81CW405, Water Division No. I. If the agreement or ruling is modified such that Denver Water is able to reuse these return flows, such return flows shall be subject to Articles I and II.</p> <p>D. Water right is partially absolute and partially conditional.</p> <p>E. Pending application in Case No. 2008CW159 to make 672 cfs absolute.</p> <p>F. Pending application in Case No. 2003CW039 to make 141,712 acre feet absolute. Under the decree in 87CW376, Denver may import through the Roberts Tunnel 150,000 af over any consecutive 10 year period.</p> <p>G. By agreement dated July 21, 1992, Denver Water has 40% interest in Wolford Mountain Reservoir capacity and water right. Although Wolford Mountain Reservoir water is not physically used on the east slope, Denver Water operates an integrated system and Wolford Mountain enables it to more fully use its Colorado River basin supplies.</p> <p>H. Amount is for portion of conditional right, which when added to the amount absolute, equals the physical capacity of the facility.</p> <p>I. Applies to only that portion of the water right needed to satisfy Denver Water's obligations under Articles I.A and I.B.</p> <p>J. Water provided to Denver Water pursuant to the terms of paragraph 9 of the May 15, 2003 Memorandum of Agreement Regarding Colorado Springs Substitution Operations shall be used for the same uses and locations as the rights listed on this Attachment A.</p> <p>K. May be used to satisfy Denver Water's obligations stemming from the ruling in Case No. 81CW405 in addition to use under Articles I.A and I.B.</p> <p>L. Denver Water's interests in this water right are the set forth in an agreement dated August 11, 1995 between Denver Water, City of Englewood and Climax Metals Company.</p>					

Enclosure 2

[Colorado River] Recovery Agreement

RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this 14th day of February, 2000, by and between the United States Fish and Wildlife Service (USFWS) and the City and County of Denver, acting by and through its Board of Water Commissioners (Denver).

WHEREAS, in 1988 the Secretary of Interior, the Governors of Wyoming, Colorado and Utah, and the Administrator of the Western Area Power Administration signed a Cooperative Agreement to implement the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program); and

WHEREAS, the Recovery Program is intended to recover the endangered fish while providing for water development in the Upper Basin to proceed in compliance with state law, interstate compacts and the Endangered Species Act; and

WHEREAS, the Colorado Water Congress has passed a resolution supporting the Recovery Program; and

WHEREAS, on December 20, 1999, USFWS issued a programmatic biological opinion (1999 Opinion) concluding that implementation of specified elements of the Recovery Action Plan (Recovery Elements), along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the endangered fish or adversely modify their critical habitat in the Colorado River subbasin within Colorado, exclusive of the Gunnison River subbasin; and

WHEREAS, the 1999 Opinion in the section entitled "Reinitiation Notice" divided depletions into Category 1 or Category 2 for reinitiation purposes; and

WHEREAS, Denver is the owner and operator of water diversion projects and facilities decreed for diversion from the Fraser, Williams Fork, Blue, Eagle and Colorado Rivers and their tributaries (Water Facilities). The operation of Denver's Water Facilities includes using water stored in Williams Fork and Woford Mountain Reservoirs for substitution and in Williams Fork Reservoir for exchange purposes. Denver's Water Facilities cause or will cause depletions to the Colorado River subbasin within Colorado, exclusive of the Gunnison River subbasin; and

WHEREAS, Denver desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the Endangered Species Act (ESA); and

WHEREAS, USFWS desires a commitment from Denver to the Recovery Program so that the Program can actually be implemented to recover the endangered fish and to carry out the Recovery Elements.

NOW THEREFORE, Denver and USFWS agree as follows:

1. USFWS agrees that implementation of the Recovery Elements specified in the 1999 Opinion will avoid the likelihood of jeopardy and adverse modification under Section 7 of the ESA, for depletion impacts caused by Denver's Water Facilities. Any consultations under Section 7 regarding Denver's Water Facilities' depletions are to be governed by the provisions of the 1999 Opinion. USFWS agrees that, except as provided in the 1999 Opinion, no other measure or action shall be required or imposed on Denver's Water Facilities to comply with Section 7 or Section 9 of the ESA with regard to its Water Facilities' depletion impacts or other impacts covered by the 1999 Opinion. Denver is entitled to rely on this Agreement in making the commitment described in paragraph 2.

2. Denver agrees not to take any action which would probably prevent the implementation of the Recovery Elements. To the extent implementing the Recovery Elements requires active cooperation by Denver, Denver agrees to take reasonable actions required to implement those Recovery Elements. Denver will not be required to take any action that would violate its decrees or the statutory authorization for its Water Facilities, or any applicable limits on Denver's legal authority. Denver will not be precluded from undertaking good faith negotiations over terms and conditions applicable to implementation of the Recovery Elements.

3. If USFWS believes that Denver has violated paragraph 2 of this Recovery Agreement, USFWS shall notify both Denver and the Management Committee of the Recovery Program. Denver and the Management Committee shall have a reasonable opportunity to comment to USFWS regarding the existence of a violation and to recommend remedies, if appropriate. USFWS will consider the comments of Denver and the comments and recommendations of the Management Committee, but retains the authority to determine the existence of a violation. If USFWS reasonably determines that a violation has occurred and will not be remedied by Denver despite an opportunity to do so, the USFWS may request reinitiation of consultation on Water Facilities without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 1999 Opinion. In that event the Water Facilities' depletions would be excluded from the depletions covered by 1999 Opinion and the protection provided by the Incidental Take Statement.

4. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of Denver's Water Facilities or USFWS' statutory authority.

5. The signing of this Recovery Agreement does not constitute any admission by Denver regarding the application of the ESA to the depletions of Denver's Water Facilities. The signing of this Recovery Agreement does not constitute any agreement by either party as to whether the flow recommendations for the 15-Mile Reach described in the 1999 Opinion are biologically or hydrologically necessary to recover the endangered fish.

6. This Recovery Agreement shall be in effect until one of the following occurs:

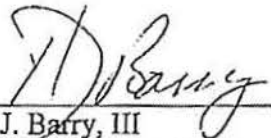
- a. USFWS removes the listed species in the Upper Colorado River Basin from the endangered or threatened species list and determines that the Recovery Elements are no longer needed to prevent the species from being relisted under the ESA; or

b. USFWS determines that the Recovery Elements are no longer needed to recover or offset the likelihood of jeopardy to the listed species in the Upper Colorado River Basin; or

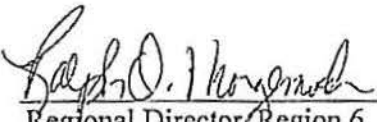
c. USFWS declares that the endangered fish in the Upper Colorado River Basin are extinct; or

d. Federal legislation is passed or federal regulatory action is taken that negates the need for [or eliminates] the Recovery Program.

7. Denver may withdraw from this Recovery Agreement upon written notice to USFWS. If Denver withdraws, USFWS may request reinitiation of consultation on Water Facilities without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 1999 Opinion.


H. J. Barry, III
Manager, Denver Water

2/14/2000
Date


Ralph D. Thompson
Regional Director, Region 6
U.S. Fish and Wildlife Service

2/14/00
Date

Appendix G-3
Report Responding to USFS Comments

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List of Acronyms

AF	acre-feet
AF/yr	acre-feet per year
ARNF	Arapaho & Roosevelt National Forests
AWTP	Advanced Water Treatment Plant
BA	Biological Assessment
BO	Biological Opinion
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
Corps	U.S. Army Corps of Engineers
CPW	Colorado Parks and Wildlife
DEIS	Draft Moffat Collection System Project Environmental Impact Statement
Denver Water	Board of Water Commissioners
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEIS	Final Moffat Collection System Project Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FSM	U.S. Forest Service Manual
MIS	Management Indicator Species
Moffat Project	Moffat Collection System Project (or Project)
NDIS	Colorado Natural Diversity Information Source
PACSM	Platte and Colorado Simulation Model
PCA	Potential Conservation Area
PEM	palustrine emergent wetlands
PSS	scrub-shrub wetlands
ROD	Record of Decision
U.S.	United States
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WTP	Water Treatment Plant

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This information has been assembled to respond to U.S. Forest Service (USFS) comments for the Moffat Collection System Project (Moffat Project). The U.S. Army Corps of Engineers (Corps) published a Draft Environmental Impact Statement (DEIS) in October to analyze the direct, indirect, and cumulative effects of this water supply project. This report is included as Appendix G-3 in the Final Environmental Impact Statement (FEIS). The Project proponent is the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water). The Corps, Omaha District, Regulatory Branch is the lead Federal agency responsible for preparing the Environmental Impact Statement (EIS). Two other Federal agencies with statutory authority over the proposed Project are participating in the National Environmental Policy Act of 1969 process as cooperating agencies, the U.S. Environmental Protection Agency (EPA), and Federal Energy Regulatory Commission (FERC). USFS declined to be a cooperating agency.

The Moffat Collection System DEIS analyzed Federally- and State listed- threatened and endangered species and species of concern. USFS comments on the DEIS provided by the Arapaho & Roosevelt National Forests (ARNF) and Pawnee National Grassland requested species of interest to the USFS be added to the analysis, including Region 2 sensitive species, ARNF species of local concern, plant communities of local concern, and Management Indicator Species (MIS). This report addresses the USFS requests for more information on species of concern to ARNF, and provided a basis for completing the analysis of special status species in the *Final* Moffat Collection System FEIS. It is intended to assist with the information needs of the USFS.

In addition, the USFS requested surveys for sensitive and locally rare plants at Gross Reservoir. In response to the request for surveys, the Corps coordinated with the ARNF botanist and wildlife biologist and conducted surveys in the summer of 2010. Survey reports are provided in the appendices to this report and the results of the surveys are discussed in the body of the report.

This report does not address Federally listed endangered, threatened, proposed and candidate species in detail, because they were previously addressed through formal Section 7 compliance. A Biological Assessment (BA) for the Moffat Project was submitted to the U.S. Fish and Wildlife Service (USFWS) in February 2009, and a Biological Opinion (BO) was received from the USFWS in July 2009. The 2009 BO is included in Appendix G-2. The Corps submitted a request for reinitiation of consultation on August 14, 2012, in response to a February 16, 2010 letter from USFWS commenting on the Draft EIS (DEIS). After some discussion, USFWS indicated that it would provide two BOs for the Project, one addressing depletions to the Platte and Colorado rivers and additional information on Preble's meadow jumping mouse, and the second addressing impacts to greenback cutthroat trout in the Fraser River and Williams Fork River systems. The Corps submitted a Revised BA for depletions and Preble's on August 14, 2013. A Final BO from the USFWS was issued on December 6, 2013 that replaced the July 2009 BO for depletions and Preble's. The Corps is preparing a Supplemental BA for greenback cutthroat trout. Section 7 consultation will be completed prior to issuance of a Record of Decision (ROD).

The geographic scope of this report is limited to National Forest lands at Gross Reservoir and potentially affected river segments in the Fraser and upper Williams Fork River Valleys.

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SECTION TWO Endangered Species Act Section 7 and USFS Requirements

Section 7 of the Endangered Species Act of 1973 (ESA), as amended, requires Federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of threatened, endangered, or proposed species, or cause the destruction or adverse modification of their critical habitats. In addition, the USFS has established guidance in U.S. Forest Service Manual (FSM) 2670 for threatened, endangered, proposed, and sensitive species habitat management. This document follows standards established in the FSM (2672.42) and the Code of Federal Regulations (50 CFR 402).

This document is intended to meet the objectives set forth in FSM 2672.41, and Region 2 FSM 2670 Supplement 2600-2009-01, which include:

- Ensure that USFS actions do not contribute to loss of viability of any native or desired non-native plant or animal species;
- Ensure that activities do not cause the status of any species to move toward Federal listing; and
- Incorporate concerns for sensitive species throughout the planning process, reducing negative impacts to species and enhancing opportunities for mitigation.

To achieve these objectives, this document reviews the Moffat Project alternatives in sufficient detail to identify the level of effect that will occur to each species, based on the best available scientific literature, a thorough analysis of the potential effects of the Project, and the professional judgment of the wildlife and fisheries biologists and ecologists who completed the evaluation.

For USFS sensitive species, the four possible determinations described in FSM 2672.42 and Region 2 FSM Supplement 2600-2009-01 are:

- “No impact”
- “Beneficial impact”
- “May adversely impact individuals or habitat, but not likely to result in a loss of viability on the planning area, nor cause a trend to Federal listing or a loss of species viability range wide”
- “Likely to result in a loss of viability on the planning area, in a trend to Federal listing, or in a loss of species viability range wide”

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The Corps determined the following Purpose and Need statement as the basis for defining and evaluating alternatives:

The purpose of the Moffat Project is to develop 18,000 acre-feet per year (AF/yr) of new firm yield to the Moffat Treatment Plant and raw water customers upstream of the Moffat Treatment Plant pursuant to the Board of Water Commissioners' commitment to its customers.

Denver Water's need for the proposed Moffat Project is based on two major issues:

1. Timeliness: Water Supply Shortage in the Near-Term Timeframe (Prior to 2032).

Beginning in 2022, Denver Water predicts its average annual water demand will exceed available supplies and will grow to 34,000 AF/yr by 2032. This shortfall was determined after analyzing existing supply, projected demand, and savings from system refinements, non-potable reuse, natural replacement, conservation, and cooperative projects with other water providers. Of this near-term 34,000 AF/yr shortfall, Denver Water will rely on 16,000 AF/yr forthcoming from the implementation of additional conservation efforts. New firm yield must be identified to meet the remaining shortfall. Denver Water proposes to meet the remaining shortfall with 18,000 AF/yr of newly developed supplies.

2. Location: Need for Water to the Moffat Water Treatment Plant (WTP) and Raw Water Customers. Approximately 90% of the available reservoir storage and 80% of the available water supplies rely on the South System. This imbalance in reservoir storage and water supplies between the North and South systems has created water supply challenges that have resulted in:

- Unreliable water supply for the Moffat WTP and Moffat Collection System raw water customers
- System-wide vulnerability issues
- Limited operational flexibility of the treated water system

To address the two major issues, Denver Water is pursuing the proposed Moffat Project to provide 18,000 AF/yr of new firm yield. Fifteen thousand acre-feet (AF) of this firm yield would be for Denver Water and its customers, the remaining 3,000 AF would be for the City of Arvada. The proposed Moffat Project would address both the overall near-term water supply shortage, and the imbalance in water storage and supply between the North and South systems.

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A history of consultation with USFWS regarding Federally-listed species is provided in Section 8.0.

The USFS provided a letter from Glenn Casamassa, ARNF Forest Supervisor, commenting on the DEIS on March 16, 2010 (USFS 2010). The comments requested additional analysis and studies of special status plant and animal species and included previous study requests 7 and 8 that the USFS had developed for the Gross Reservoir Hydroelectric Project. In its letter, USFS also provided the following lists of species that needed to be addressed:

- Table 1: Federally Listed Species that may occur on the ARNF or that may be impacted by water depletions or changes in water levels
- Table 2A: Region 2 USFS Sensitive Species for the ARNF, Terrestrial Wildlife
- Table 2B: Region 2 USFS Sensitive Species for the ARNF, Plants
- Table 3: Management Indicator Species (MIS) for ARNF
- Table 4: Plant Species of Local Concern for the ARNF
- Table 5: Plant Communities of Local Concern for the ARNF

The Corps contacted the USFS regarding their comments and study requests. Oscar Martinez provided contact information for ARNF biologists Steve Popovich and Bev Baker. Telephone conversations were held with Steve Popovich on several occasions to refine the lists of species for which surveys would be conducted at Gross Reservoir, to discuss past surveys and sources of information, and to discuss appropriate survey personnel, survey progress and results. Telephone and email contacts were made prior to field studies in the late summer of 2010, and at various times during 2010, 2011, and 2012. Conversations with Bev Baker included requests for wildlife habitat information and discussion of wildlife studies and mitigation. Contacts were made prior to field studies in 2010, and at other times in 2010 and 2011.

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SECTION FIVE Description of the Proposed Action (Alternative 1a) and Other Alternatives

The EIS addressed five action alternatives, plus the No Action Alternative:

5.1 PROPOSED ACTION (ALTERNATIVE 1A)

Gross Reservoir Expansion with Environmental Pool for Mitigation (Additional 77,000 AF). Using existing collection infrastructure, water from the Fraser and Williams Fork river basins, and South Boulder Creek, would be diverted during average and wet-years and delivered to an enlarged Gross Reservoir. In order to form this water supply and provide 18,000 AF of new yield, the existing Gross Reservoir would be expanded from 41,811 to 113,811 AF in order to provide an additional 72,000 AF of storage capacity. In addition, Denver Water proposes to create an additional 5,000 AF of storage in the reservoir in order to store water that would be used in flow releases to enhance aquatic habitat in South Boulder Creek. This additional storage is identified as the Environmental Pool throughout this document. Existing facilities would be used to deliver water from the Gross Reservoir Expansion to the Moffat WTP, including the South Boulder Diversion Canal, and Conduits 16 and 22.

5.2 ALTERNATIVE 1C – GROSS RESERVOIR EXPANSION (ADDITIONAL 40,700 AF)/NEW LEYDEN GULCH RESERVOIR (31,300 AF)

Alternative 1c would combine additional Moffat Collection System supplies and two reservoir storage facilities to provide 18,000 AF/yr of new firm yield. The existing Gross Dam would be raised 85 feet to provide an additional 40,700 AF of new storage capacity at Gross Reservoir. A new off-stream reservoir would be constructed in Leyden Gulch to provide 31,300 AF of active storage capacity. This combination of reservoir storage represents a balance of construction cost, relocation requirements, operational considerations, and potential environmental impacts based on existing information and analyses. The exact combination of storage sizes may vary, based on more precise design data, but would still total 72,000 AF of new reservoir storage.

Using existing Denver Water collection infrastructure, average to wet-year Fraser and Williams Fork river basins, and South Boulder Creek water would be delivered via the Moffat Tunnel and South Boulder Creek to an enlarged Gross Reservoir and via the South Boulder Diversion Canal to a new Leyden Gulch Reservoir. A combination of existing and new facilities would be used to deliver water from the enlarged Gross Reservoir and the new Leyden Gulch Reservoir to the Moffat WTP. Water would be released from storage and delivered to Denver Water customers when needed.

5.3 ALTERNATIVE 8A – GROSS RESERVOIR EXPANSION (ADDITIONAL 52,000 AF)/REUSABLE RETURN FLOWS/GRAVEL PIT STORAGE (5,000 AF)

This alternative would combine storage of Moffat Collection System supplies in an expansion of the existing Gross Reservoir with reusable return flows to provide 18,000 AF/yr of new firm yield. Approximately 13,000 AF/yr of new firm yield would be provided by the expansion of Gross Reservoir, while 5,000 AF/yr of new firm yield would be provided by reusable return flows stored in gravel pits along the South Platte River.

The existing Gross Dam would be raised 101 feet to provide an additional 52,000 AF of new storage capacity in an expanded Gross Reservoir. When available, additional water diverted from the Fraser River, Williams Fork River, and South Boulder Creek at existing Denver Water facilities under existing Denver Water water rights, would be stored in an expanded Gross Reservoir.

A new diversion structure and gravel pit storage facilities would be constructed along the South Platte River. Reusable return flows would be diverted from the South Platte River, when available, to fill the new gravel pit storage facilities. When needed, water would be recovered from gravel pit storage, treated at a new Advanced Water Treatment Plant (AWTP), and conveyed via new pipelines to the Moffat Collection System.

5.4 ALTERNATIVE 10A – GROSS RESERVOIR EXPANSION (ADDITIONAL 52,000 AF)/REUSABLE RETURN FLOWS/DENVER BASIN AQUIFER STORAGE (20,000 AF)

Alternative 10a would combine storage of Moffat Collection System supplies in an expansion of the existing Gross Reservoir with deep aquifer storage of reusable return flows to provide 18,000 AF/yr of new firm yield. Approximately 13,000 AF/yr of new firm yield would be provided by the enlargement of Gross Reservoir, while 5,000 AF/yr of new firm yield would be provided by reusable return flows and deep aquifer storage and recovery.

The existing Gross Dam would be raised 101 feet to provide an additional 52,000 AF of new storage capacity. When available, additional water diverted from the Fraser River, Williams Fork River, and South Boulder Creek at existing Denver Water facilities under existing Denver Water water rights, would be stored in an enlarged Gross Reservoir.

When available, reusable return flows at the Denver Water Recycling Plant would be treated at a new AWTP and conveyed via a new pipeline distribution system to an injection/recovery well field in the city of Denver. This water would be injected into the Denver Basin deep aquifers for storage. The estimated storage capacity would be 20,000 AF. When needed, previously stored water would be recovered from the groundwater basin and conveyed through new pipelines to the Moffat Collection System.

Denver Water currently uses the bulk of their reusable supplies during the summer months primarily to meet non-potable demands and as an exchange supply. As with Alternative 8a, reusable return flows for the Moffat Project would be available primarily during the winter months from November through March when Denver Water's non-potable demands and exchange potential are lowest.

5.5 ALTERNATIVE 13A – GROSS RESERVOIR EXPANSION (ADDITIONAL 60,000 AF)/TRANSFER OF AGRICULTURAL WATER RIGHTS/GRAVEL PIT STORAGE (3,625 AF)

This alternative would combine storage of Moffat Collection System supplies in an expansion of the existing Gross Reservoir with a purchase and transfer of existing South Platte River agricultural water rights stored in gravel pit storage facilities to provide 18,000 AF/yr of new firm yield. Approximately 15,000 AF/yr of new firm yield would be

SECTION FIVE Description of the Proposed Action (Alternative 1a) and Other Alternatives

provided by Moffat Collection System supplies and the enlargement of Gross Reservoir, while 3,000 AF/yr of new firm yield would be provided by gravel pit storage and transferred South Platte agricultural water rights.

The existing Gross Dam would be raised 110 feet to provide an additional 60,000 AF of new storage capacity in an expanded Gross Reservoir. When available, additional water diverted from the Fraser River, Williams Fork River, and South Boulder Creek at existing Denver Water facilities, under existing Denver Water water rights, would be stored in an expanded Gross Reservoir.

Senior agricultural water rights, owned by ditch companies diverting from the South Platte River downstream of Denver, would be purchased and converted to municipal/industrial use. Water rights sufficient in quantity and priority would be purchased to produce approximately 3,000 AF/yr of new firm yield when combined with 3,625 AF of new gravel pit storage. Gravel pit storage is needed to firm the agricultural water rights supply, provide operational storage, and meet winter return flow obligations associated with historical use of the agricultural water rights. A new diversion from the South Platte River, as described in Alternative 8a, would divert water to the gravel pit storage facility.

5.6 NO ACTION ALTERNATIVE

The No Action Alternative assumes that Denver Water would not receive approval from the Corps to implement the Moffat Project. The No Action Alternative would require Denver Water to use a combination of strategies to meet the need for additional water supply, including using a portion of its Strategic Water Reserve and imposing mandatory restrictions to help reduce demand during drought periods.

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This report addresses impacts to species at Gross Reservoir and in the Fraser and Williams Fork River Valleys, the only areas involving lands managed by ARNF. The Project Area for the EIS addresses a much larger number of facilities and areas for the action alternatives, including:

- An additional new reservoir site (Alternative 1c, Leyden Gulch Reservoir site),
- Additional existing reservoirs that would have changes in operation or water levels (all alternatives),
- Conveyance systems (water pipelines) from the Moffat Collection System to an Advanced Water Treatment Facility (Alternatives 8a, 10, and 13a),
- South Platte River Facilities (Alternatives 8a and 13a),
- Denver Basin Aquifer Facilities (Alternative 10a), and
- Impacts to river segments additional to the Fraser and Williams Fork (all alternatives).

6.1 GROSS RESERVOIR STUDY AREA

Gross Reservoir, located in Boulder County, is a component of all EIS action alternatives. The boundary of the study area is the current FERC-licensed project boundary modified to include all proposed facilities (Figure 6-1, Attachment A). The description of the existing environment is based on field studies conducted in 2005, 2006, and 2010.

Gross Reservoir is a steep-sided reservoir with limited shallow-water areas near the shoreline. At bankfull (surface elevation of 7,282 feet), the depth of the reservoir is approximately 330 feet, with a surface area of 418 acres. The elevation of the reservoir fluctuates approximately 48 feet within a year as drawdowns use stored water.

Gross Reservoir is located on the eastern slope of the Colorado Rocky Mountain Front Range, in the rugged South Boulder Creek Canyon, which contains narrow V-shaped valleys that have steep slopes (greater than 25%) and small areas of relatively flat topography. Numerous near vertical cliffs, up to a few hundred feet high, exist at the site. Ridges between the valleys and higher areas have more gentle slopes and some relatively small flat areas. Stream valley bottoms are steep, narrow, and filled with boulders. The following vegetation communities and cover types are present in the Gross Reservoir study area:

Grass/Forb Rangelands. Two types occur. The grass/forb mix community (montane grassland) occurs primarily on the eastern shore of the reservoir, though small patches occur elsewhere in the study area. Montane grassland is comprised of a mix of xeric montane species. Shrubs, forbs and grasses occur in nearly equal proportions. Clumps of wax currant (*Ribes cereum*) and Fendler's ceanothus (*Ceanothus fendleri*) intermingle with forbs and grasses. Common forb and grass species include hairy false golden aster (*Heterotheca villosa*), fringed sage (*Artemisia frigida*), sulphur buckwheat (*Erigeron umbellatum*), common yarrow (*Achillea millefolium*), Colorado wildrye (*Leymus ambiguus*), cheatgrass (*Bromus tectorum*), Porter's brome (*Bromus porteri*), and mountain muhly (*Muhlenbergia montana*). Patches of this community frequently intermingle with

the open ponderosa pine community. The boundaries between these communities are obscured by a high degree of vegetative similarity; the primary difference being the presence of a forested overstory in the ponderosa pine community.

Disturbed rangelands occur on the western portion of the Gross Reservoir study area where a prescribed burn was conducted several years ago in a ponderosa pine community and a grass/forb community. Native plants such as fringed sage, hairy false golden aster, white sagebrush (*Artemisia ludoviciana*), geranium (*Geranium* spp.), Colorado wildrye, mountain muhly, bluebunch wheatgrass (*Pseudoroegneria spicata*), and sedge (*Carex* spp.) are common, but invasive species such as cheatgrass, common mullein, and musk thistle make a significant contribution to the relative cover in some locations. A portion of this area is used for camping and requires off-road vehicle or pedestrian access.

Conifer Forest. There are two types of conifer forest, open ponderosa pine forest and mixed conifer forest. Open ponderosa pine communities are typically found on dry (xeric) slopes that have southern, eastern or western aspects. Within this community type, ponderosa pine is the dominant tree but Douglas-fir and Rocky Mountain juniper (*Juniperus scopulorum*) trees also occur. Shrubs are common in the understory. Grasses and sedges are slightly less abundant in the understory. Based on field observations, these areas have a 10 to 30% tree canopy cover and an average basal area of 53 square feet/acre.

The ponderosa pine/Douglas-fir mix (mixed conifer) communities have dense canopies of mixed conifer trees, which have suppressed understory production. These areas are typically found on moderately moist (mesic) slopes that have northern or western aspects. Ponderosa pine and Douglas fir are the dominant trees and occur in nearly equal proportions. Some Rocky Mountain juniper and Rocky Mountain maple (*Acer glabrum*) trees are also present in the canopy. Tree canopy cover is greater than 30% with the average basal area at 65 square feet/acre.

Riparian areas include forested riparian, shrub riparian, and herbaceous riparian along the Gross Reservoir shoreline and in surrounding drainages. Riparian communities include areas that are considered to be wetlands under the jurisdiction of the Corps under Section 404 of the Clean Water Act, and moist woodlands or shrub communities adjacent to creeks, wetlands, and the reservoir shoreline. The reservoir shoreline vegetation contains small, scattered patches of wetland shrubs and a few areas of emergent herbaceous species. Wetland vegetation within drainages is sparse and intermixed with riparian shrubs and herbaceous vegetation.

Riparian woodlands associated with drainages are commonly dominated by plains and narrowleaf cottonwood, very tall thinleaf alder, and water birch (*Betula occidentalis*), along with several conifer species, including Douglas-fir, lodgepole pine (*Pinus contorta*), blue spruce (*Picea pungens*), and Engelmann spruce (*Picea engelmanni*). Wet riparian shrublands are dominated by thinleaf alder, water birch, Missouri River willow (*Salix eriocephala*), sandbar willow, and park willow (*Salix monticola*). Moist riparian shrublands along drainages are diverse, with a mix of various willows, serviceberry (*Amelanchier alnifolia*), water birch, redosier dogwood (*Cornus sericea*), cliffbush (*Jamesia americana*), ninebark (*Physocarpus monogyrus*), chokecherry, various gooseberries (*Ribes* spp.), Woods' rose, and roundleaf snowberry (*Symphoricarpos rotundifolius*), along with patches of dense herbaceous vegetation. Emergent wetlands

associated with the drainages are commonly dominated by giant angelica (*Angelica ampla*), common spikerush (*Eleocharis palustris*), field horsetail (*Equisetum arvense*), fowl mannagrass, and American speedwell (*Veronica americana*).

Talus Slopes and Rock Outcrops are comprised mostly of large solid or fragmented rocks and occur throughout the study area at all elevations. Along the north side of the study area, rock outcrops generally occur within mixed conifer forest approximately 200 feet upslope of the reservoir. Within canyons or drainages, outcrops flank narrow riparian corridors. Rock outcrop communities contain less than 15 percent vascular vegetation and are comprised primarily of species with the ability to colonize depressions or cracks within the rocks.

Disturbed Soil includes areas where human activities, such as excavation and disposal sites, have created bare ground and the vegetative cover is less than 10%. Forbs make the largest contribution to the relative cover in disturbed areas. This community type is found west of the dam and east of the boat launch, where construction activities and recreation have impacted the vegetation, resulting in barren areas. Small areas of disturbed soil also occur within the montane grassland community on the western portion of the Gross Reservoir study area (Winiger Gulch) as a result of off-highway vehicle use and erosion. Dominant forb species include yellow sweetclover (*Melilotus officinalis*), hairy false golden aster, field sagewort (*Artemisia campestris*), white sagebrush, and fringed sage. Grasses make a minor contribution to the relative cover in disturbed areas. Common grass species include Canada bluegrass (*Poa compressa*), fescue (*Festuca* spp.), cheatgrass, and Porter's brome. Noxious weed species associated with disturbed soil include cheatgrass and common mullein.

Standing Water. The reservoir surface at its current capacity is approximately 418 acres. As the reservoir is drawn down, previously inundated areas become exposed that are generally devoid of vegetation. These areas support annual vegetation periodically, particularly following periods of prolonged drawdown.

6.2 FRASER AND WILLIAMS FORK RIVER VALLEYS

The EIS addresses impacts to various river segments that may be affected by diversions from the streams, impacts to downstream flows, and/or because Denver Water delivers water to storage or treatment facilities through some streams such as South Boulder Creek above and below Gross Reservoir, and Vasquez Creek in the Fraser Valley. All of the diversion sites are existing, and there would be no construction or modification of the structures to implement the Project. However, there would be changes in the amounts of water diverted.

Denver Water has 31 primary diversion points in the Fraser River Basin (Table 6-1 and Figure 6-2, Attachment A). For the period from 1975 through 2005, the Moffat Tunnel conveyed an average of 55,800 AF per year under the Continental Divide. The water is delivered to South Boulder Creek on the East Slope, stored in Gross Reservoir, and eventually taken to the Moffat WTP in Lakewood. The diversions are located within the ARNF, but the affected stream reaches are only partly located on the ARNF. Slightly more than half of the Fraser Valley stream segments are on ARNF, including all of the smaller drainages and the upper portions of the Fraser River and larger tributaries. A total

of about 95 miles of stream length occurs below the diversions in the Fraser Valley, of which the Fraser Valley is 27.7 miles, and the larger tributaries (St. Louis Creek, Main Ranch Creek) are a total of 20.3 miles.

Denver Water also has four diversions in the upper Williams Fork. Denver Water's collection system in the Williams Fork River headwaters diverts from McQueary, Jones, Bobtail, and Steelman creeks, directing flow to the Gumlick Tunnel (Jones Pass Tunnel) for delivery into Vasquez Creek in the Fraser River Basin via the Vasquez Tunnel. The Williams Fork collection system intercepts a drainage area of approximately 14.2 square miles.

The EIS provided a general description of riparian habitats based on Colorado Parks and Wildlife (CPW) riparian data, and a detailed evaluation of four study sites used for multidisciplinary studies. Sites FR1 and FR2 are located along the Fraser River, Site FR3 along St. Louis Creek, and Site FR4 along main Ranch Creek. Sites WF1 and WF2 are located along the Williams Fork. Further information about riparian areas and conditions at the detailed study sites can be found in Section 3.6.5 of the FEIS.

Table 6-1
Streams Affected by Denver Water Diversions in the Fraser
and Williams Fork River Valleys

Stream	Description	Affected Length (mile)	Approximate Length in ARNF	Approximate Elevation in ARNF (feet)
FRASER RIVER WATERSHED				
Fraser River Upstream Tributaries and Mainstem				
Jim Creek	From Denver Water diversion points to confluence with Fraser River	0.9	0.9	9,200-9,400
Buck Creek		0.6	0.6	9,000-9,400
Cub Creek		0.5	0.5	9,000-9,400
Cooper Creek		0.6	0.6	9,000-9,400
Fraser River	From Moffat Tunnel to Colorado River	27.7	4.0	8,900-9,400
St. Louis Creek				
Short Creek	From Denver Water diversion point to confluence with West St. Louis Creek	0.2	0.2	9,400-9,500
West St. Louis Creek	From Denver Water diversion points to confluence with St. Louis Creek mainstem	2.4	2.4	9,000-9,500
Iron Creek		0.2	0.2	9,400-9,500
Byers Creek		0.2	0.2	9,300-9,500
East St. Louis Creek		0.5	0.5	9,200-9,500
Fool Creek		0.9	0.9	9,100-9,400
King Creek		1.4	1.0	9,000-9,400
St. Louis Creek	From Range Creek to Fraser River	9.7	4.5	8,700-9,500
Elk/Vasquez Creek				
West Elk Creek	From Denver Water diversion points to confluence with main Elk Creek	2.0	1.0	8,900-9,400
East Elk Creek		0.1	0.1	9,300-9,400

**Table 6-1 (cont.)
Streams Affected by Denver Water Diversions in the Fraser
and Williams Fork River Valleys**

Stream	Description	Affected Length (mile)	Approximate Length in ARNF	Approximate Elevation in ARNF (feet)
West Fork main Elk Creek (East Elk Creek)	From Denver Water diversion points to confluence of main Elk Creek (East Elk Creek)	0.1	0.1	9,400
East Fork main Elk Creek (East Elk Creek)		0.3	0.3	9,400
Main Elk Creek	From confluence of West and East forks of Elk Creek to Fraser River	4.7	1.7	8,900-9,400
Little Vasquez Creek	From Denver Water diversion point to confluence with Vasquez Creek	1.3	1.1	9,000-9,400
Vasquez Creek	From Denver Water diversion point to confluence with Fraser River	3.0	2.0	9,000-9,400
Ranch Creek				
Trail Creek	From Denver Water diversion point to confluence with Hurd Creek	3.5	3.4	8,500-9,600
Hamilton Creek		3.0	1.7	8,900-9,600
Hurd Creek	From Denver Water diversion point to confluence with main Ranch Creek	4.1	2.5	8,500-9,600
Meadow Creek		5.8	5.6	8,400-9,600
North Fork Ranch Creek		0.8	0.8	9,100-9,500
Dribble Creek		0.5	0.5	9,200-9,500
Middle Fork Ranch Creek		2.0	1.5	8,900-9,500
South Fork Ranch Creek		2.7	1.9	8,900-9,400
Little Cabin Creek		2.1	1.0	8,800-9,500
Cabin Creek		2.7	1.7	8,600-9,600
Main Ranch Creek	From Denver Water diversion point to confluence with Fraser River	10.6	1.5	8,900-9,500
WILLIAMS FORK WATERSHED				
Steelman Creek	From Denver Water diversion points to confluence with Williams Fork	1.9	1.9	9,900-10,500
Bobtail Creek		1.6	1.6	9,900-10,400
McQueary Creek		0.4	0.4	9,900-10,400
Jones Creek	From Denver Water diversion point to confluence with Bobtail Creek	0.2	0.2	10,300-10,400
Williams Fork	From confluence with Steelman Creek to confluence with South Fork of Williams Fork	8.1	8.1	8,900-9,900

There are large valley wetland/riparian areas on USFS lands below the diversions along Fraser River, St. Louis Creek, Vasquez Creek, Jim Creek, West St. Louis Creek, and West Elk Creek. Wetland/riparian areas are also present along some of the tributaries in the Englewood Ranch Gravity System, including Trail Creek, Meadow Creek, Hurd Creek, and Cabin Creeks. The other tributaries occur primarily on steep terrain and have limited riparian habitat in narrow valleys. In the Williams Fork valley, there are large valley wetlands below the diversion on Steelman Creek and the mainstem Williams Fork.

In its comments on the DEIS and in subsequent conversations between ARNF and the Corps, the USFS provided lists of special status species to be considered in the analysis. These lists included USFS Region 2 Sensitive Species, ARNF MIS Species, ARNF plant species of local concern and ARNF plant communities of local concern. These lists are included in Tables 9-1, 10-1, 11-1, and 12-1. As shown in these tables, each species was evaluated as to whether it needed to be addressed in detail in this document. For the Gross Reservoir study area, the decision was made based on presence or absence of suitable habitat. For the Fraser and Williams Fork River Valleys, the decision was based on whether the species were dependent on aquatic or riparian habitat.

Data from previous surveys was obtained and reviewed. Surveys conducted for the DEIS in 2005 and 2006 included vegetation, and wetlands and riparian areas. A previous rare plant survey of the Gross Reservoir study area was conducted by Rick Brune in 2001 for Denver Water's Recreation Management Plan and power line relocation associated with the FERC relicensing (Shapins Associates 2002). The 2001 survey did not include all areas of anticipated disturbance for the proposed reservoir enlargement, and partially extended outside of the Gross Reservoir study area along Forsythe Canyon. These surveys were conducted in June, July, and August 2001. Rick Brune conducted a second survey in the area north of the dam in 2003 but did not find any special status plant species (Brune 2003). Colorado Natural Heritage Program (CNHP) found Sprengel's sedge, near Gross Reservoir in 2007 (CNHP 2009) and the location was obtained from USFS. GPS data was also obtained for the rare plants recorded by Rick Brune.

Field surveys were conducted in 2010 at Gross Reservoir for rare plants and habitats and for northern goshawk and northern leopard frog. The methods and results of these surveys are presented in detail in Appendices B, C, and D. Surveys for certain plant species were conducted by Scott Smith at the recommendation of Steve Popovich. Steve Popovich also recommended that Denise Culver of CNHP conduct surveys for certain other species, but she had a scheduling conflict during the field season. URS biologists addressed all of the remaining plant species and vegetation communities during field surveys at Gross Reservoir. Table 7-1 provides the list of target species and the recommended and actual surveyor for each species.

The locations of rare plants identified were recorded by GPS in the field and the information was transferred to a GIS database. All of the action alternatives involve ground disturbance and removal of vegetation during construction, and inundation of new areas during reservoir filling. Impact analysis focused on direct impacts that would result from construction and reservoir filling. Impacts were assessed by overlaying inundation lines and disturbance areas over the location data.

Surveys for wetlands, potential sources of hydrology and fens were made in the Fraser and Williams Fork River Valleys in September 2010, at stream geomorphology/riparian sample sites, groundwater sampling sites, Denver Water diversions and other locations. Soil samples were collected from some potential fen locations to validate field observations and were analyzed for organic matter and clay content at Colorado State University. The results of these observations were incorporated into the FEIS and a separate report was not produced.

Table 7-1
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended Surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Region 2 USFS Sensitive Species for the ARNF Potentially present at Gross Reservoir					
Park milkvetch	<i>Astragalus leptaleus</i>	Low	Season is already too late for standard identification (Popovich 7/11/2010)	CNHP	Scott Smith
Upswept moonwort	<i>Botrychium ascendens</i>	Low		Scott Smith	Scott Smith
Fork-leaved moonwort	<i>Botrychium "furcatum"</i>	Low		Scott Smith	Scott Smith
Slender moonwort	<i>Botrychium lineare</i>	Medium		Scott Smith	Scott Smith
Paradox moonwort	<i>Botrychium paradoxum</i>	Low		Scott Smith	Scott Smith
Lesser panicled sedge	<i>Carex diandra</i>	Low		CNHP	Scott Smith and URS
Livid sedge	<i>Carex livida</i>	Low		CNHP	URS
Yellow lady's slipper	<i>Cypripedium calceolus</i> spp. <i>parviflorum</i>	Medium to High		Scott Smith	Scott Smith
Stream orchid	<i>Epipactis gigantea</i>	Low to medium		Scott Smith	Scott Smith
Colorado tansy-aster	<i>Macheeranthera coloradensis</i>	Low		CNHP, Corps	Scott Smith and URS
Adder's mouth	<i>Malaxis brachypoda</i>	Medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Budding monkeyflower	<i>Mimulus gemmiparus</i>	Low	Included in Brune search list in 2002, not found	Corps	Scott Smith and URS
Rocky Mountain cinquefoil	<i>Potentilla rupicola</i>	Low to medium	Season is already too late for standard identification (Popovich 2010)	CNHP	Scott Smith

Table 7-1 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended Surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Greenland primrose	<i>Primula egaliksensis</i>	Low		CNHP	URS
Dwarf raspberry	<i>Rubus arcticus</i> ssp. <i>acaulis</i> (<i>Cylactis arctica</i> ssp. <i>acaulis</i>)	Known to occur in study area	Found by Rick Brune upstream of study area	CNHP	Scott Smith and URS
Silver willow	<i>Salix candida</i>	Low		Corps	URS
Autumn willow	<i>Salix serissima</i>	Low	Included in Brune search list in 2002, not found	Corps	Scott Smith and URS
Sphagnum (peat moss)	<i>Sphagnum angustifolium</i>	Low		CNHP	Scott Smith and URS
Baltic sphagnum	<i>Sphagnum balticum</i>	Low		CNHP	Scott Smith and URS
Lesser bladderwort	<i>Utricularia minor</i>	Low	Only one site known on forest	Corps	Scott Smith and URS
Selkirk's violet	<i>Viola selkirkii</i>	Medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Plant Species of Local Concern for the ARNF					
Ferns, all except <i>Cystopteris fragilis</i>	Various	High		Scott Smith	Scott Smith
Larimer aletes	<i>Aletes humilis</i>	Low		Corps	URS
Wild sarsaparilla	<i>Aralis nudicaulis</i>	Known in study area	Rick Brune found 6 sites	Corps	URS
Paper birch	<i>Betula papyrifera</i>	Low		CNHP/Corps	URS
Triangle-leaved moonwort, green-stemmed phase	<i>Botrychium lanceolatum</i> ssp. "viride"	Low		Scott Smith	Scott Smith

Table 7-1 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended Surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Leather leaf grapefern	<i>Botrychium multifidum</i>	Low to medium		Scott Smith	Scott Smith
Northwestern moonwort	<i>Botrychium pinnatum</i>	Low		Scott Smith	Scott Smith
“Redbank” moonwort	<i>Botrychium</i> “redbank”	Low		Scott Smith	Scott Smith
Least moonwort	<i>Botrychium simplex</i>	Low to medium		Scott Smith	Scott Smith
Rattlesnake fern	<i>Botrypus virginianus</i>	Low to medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Dewey sedge	<i>Carex deweyana</i>	Known in study area	Rick Brune reported two sites in study area	CNHP	URS
Woodyfruit sedge	<i>Carex lasiocarpa</i>	Low		Corps	URS
Mud sedge	<i>Carex limosa</i>	Low		Corps	URS
Peck’s sedge	<i>Carex peckii</i>	Low	Was included in Brune search list, not found	CNHP	URS
Sprengel’s sedge	<i>Carex sprengelii</i>	Known in study area	Reported by CNHP.	CNHP	URS
Enchantress’s nightshade	<i>Circaea alpina</i>	Known in study area		Corps	URS
Purple cinquefoil	<i>Comarum palustre</i>	Medium to High		Corps	URS
Yellow coralroot	<i>Corallorhiza trifida</i>	Medium		Scott Smith	Scott Smith and URS
Spring coralroot	<i>Corallorhiza wisteriana</i>	Medium		Scott Smith	Scott Smith and URS
Bunchberry	<i>Cornus canadensis</i>	Low		Corps	URS

Table 7-1 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended Surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Hazelnut	<i>Corylus cornuta</i>	Medium		Corps	URS
Rattlesnake-plantain	<i>Goodyera repens</i>	Medium	Included in Brune search list, not found	Scott Smith/ Corps	Scott Smith
Tall blue lettuce	<i>Lactuca biennis</i>	Known in study area	One occurrence found by Rick Brune upstream on Forsythe Gulch	Corps, CNHP	URS
Rocky Mountain blazing star	<i>Liatris ligulistylis</i>	Low	Included in Brune search list, not found	Corps, CNHP	URS
Wood lily	<i>Lilium philadelphicum</i>	Low to medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Northern twayblade	<i>Listera borealis</i>	Low		Scott Smith	Scott Smith
Broadlipped twayblade	<i>Listera convallarioides</i>	Low	Included in Brune search list, not found	Scott Smith	Scott Smith
Heartleaved twayblade	<i>Listera cordata</i>	High		Scott Smith	Scott Smith
Utah lupine	<i>Lupinus lepidus</i> var. <i>utahensis</i>	Low		Corps	URS
Stiff club-moss	<i>Lycopodium annotinum</i>	Low		All	URS
Fringed loosestrife	<i>Lysimachia ciliata</i>	Medium to high		CNHP, Corps	URS
Leechleaf blazingstar	<i>Mentzelia sinuata</i>	Low		CNHP, Corps	URS
Buckbean	<i>Menyanthes trifoliata</i>	Low		Corps	URS
Sweet coltsfoot	<i>Petasites saggitatus</i>	Low		Corps	URS
Silvery primrose	<i>Primula incana</i>	Low		Corps	URS
Pictureleaf wintergreen	<i>Pyrola picta</i>	Low to medium	Included in Brune search list, not found	Scott Smith, Corps	URS

Table 7-1 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended Surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Maryland sanicle	<i>Sanicula marilandica</i>	Known in study area	One site reported by Rick Brune	CNHP	URS
False melic	<i>Schizachne purpurascens</i>	Known in study area	One site reported by Rick Brune upstream on Forsythe Gulch	CNHP, Corps	URS
All other sphagnum species not included as sensitive	<i>Sphagnum</i> spp.	Low		Corps	URS
Plant Communities of Local Concern for the ARNF					
Colorado blue spruce	<i>Picea pungens</i>	Known in study area		CNHP	URS
Ponderosa pine/spike fescue	<i>Pinus ponderosa</i> <i>Leucopoa kingii</i>	Medium to high	Included in Brune search list, not found	CNHP	URS
Ponderosa pine/ antelope bitterbrush	<i>Pinus ponderosa</i> / <i>Purshia tridentata</i>	Medium to high		CNHP	URS
Relictual prairie grass riverine community	<i>Spartina pectinata</i> – <i>Sorghastrum avenaceum</i> – <i>Andropogon gerardii</i> – <i>Dicahanthelium oligosanthes</i> – <i>Hypericum majus</i>	Medium		CNHP	URS
Ponderosa pine old growth	<i>Pinus ponderosa</i>	Known in study area	A portion of study area was mapped as ponderosa old growth by USFS in work for 1997 Forest Plan	CNHP	URS

Table 7-1 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended Surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Upwelling/ dome springs/ seeps		Low		CNHP	URS
Thinleaf alder/ mesic forb riparian shrubland	<i>Alnus incana/ mesic forbs shrubland</i>	Known in study area		CNHP	URS
Foothills riparian shrubland	<i>Betula occidentalis/ Maianthemum stellatum</i> or other forbs	Known in study area	According to Brune report “apparently grows in much of Forsythe Canyon, possibly mixed with other riparian plant associations”	CNHP	URS
Fens	Habitat for a number of USFS Sensitive and local concern plant species	Known in study area (Williams Fork River Valley)		Corps, CNHP (Gross) Corps (Williams Fork River Valley)	URS

The only Project-related changes along the river segments are changes in stream flows due to increased diversions and changes in the operation of Denver Water's system. All of the alternatives, including the No Action, would involve change in Denver Water's management of its existing system that would result in flow changes in the Fraser River and its tributaries, Williams Fork River and its tributaries, Colorado River, Blue River, South Boulder Creek, North Fork South Platte River, and South Platte River. Potential changes in the extent of wetland and riparian areas along the affected river segments are evaluated in the EIS, and the results were used in the assessment of impacts to aquatic and riparian special status species in the Fraser and Williams Fork River Valleys. Changes in stream flows were modeled using Denver Water's Platte and Colorado Simulation Model (PACSM), which is a water allocation computer model (See FEIS Section 4.6.1 for description of this model). PACSM accounts for inflows, diversions, river gains and losses, reservoir operations, and water rights implementation using water allocation priorities. Changes in riparian and wetland vegetation were assessed using the Corps HEC-RAS computer software (version 4.0) for analysis of stream hydraulics. HEC-RAS output was used to determine changes in water surface elevations and differences in the width of channel that would be inundated. Detailed results are provided in FEIS Sections 4.6.8 and 5.8.

A BA for the Moffat Project was submitted to the USFWS in February 2009, and a BO was received from the USFWS in July 2009. The BO is included in Appendix G-2 of the FEIS. The Corps was subsequently notified that a supplemental analysis would be required to address the presence of greenback cutthroat trout in streams in the Fraser and Williams Fork River valleys. The Corps submitted a request for reinitiation of consultation on August 14, 2012, in response to a February 16, 2010 letter from USFWS commenting on the DEIS. After some discussion, the Corps submitted a Revised BA for depletions to the Platte and Colorado rivers and information on Preble's on August 14, 2013. A Revised BO from the USFWS was issued on December 6, 2013 that replaced the 2009 BO for depletions and Preble's. The Corps is preparing a Supplemental BA for greenback cutthroat trout. Section 7 consultation will be completed prior to issuance of the ROD.

The results of the 2013 BO are summarized below:

Species Associated with the Moffat Project Construction and Operations Areas. The USFWS concurred with the Revised BA determinations that the Project is "not likely to adversely affect" the following species in Colorado:

- Preble's meadow jumping mouse (*Zapus hudsonius preblei*, threatened)
- Ute ladies'-tresses orchid (*Spiranthes diluvialis*, threatened)
- Greenback cutthroat trout (*Oncorhynchus clarki stomias*, threatened)

The USFWS also concurred with the determinations of "no effect" for the following species

- Canada lynx (*Lynx canadensis*, threatened)
- Mexican spotted owl (*Strix occidentalis lucida*, threatened)
- Yellow-billed cuckoo (*Coccyzus americanus*, candidate) (western Distinct Population Segment, Proposed Threatened – October 3, 2013)

Species Associated with the Platte River in Nebraska. The USFWS concurred with the determination of likely to adversely affect for the following species and critical habitat in the central and lower Platte River in Nebraska

- Whooping crane (*Grus americana*, endangered)
- Whooping crane critical habitat
- Least tern (*Sterna antillarum*, endangered)
- Pallid sturgeon (*Scaphirhynchus albus*, endangered)
- Northern Great Plains population of piping plover (*Charadrius melodus*, threatened)
- Western prairie fringed orchid (*Plantanthera praeclara*, threatened)

For these species, the USFWS concluded that the proposed Moffat Project is consistent with the Tier I Programmatic BO for the Platte River Recovery Implementation Program, that the Project is not likely to jeopardize these species, and is unlikely to destroy or adversely affect critical habitat.

The USFWS also concurred with a “not likely to adversely affect” determination for the American burying beetle (*Nicrophorus americanus*, endangered) and “no effect” for Eskimo curlew (*Numenius borealis*, endangered) in Nebraska.

Species Associated with the Upper Colorado River. The USFWS concurred with the determinations of “likely to adversely affect” for the following species and their designated critical habitat in the upper Colorado River Basin:

- Colorado pikeminnow (*Ptychocheilus lucius*, endangered)
- Razorback sucker (*Xyrauchen texanus*, endangered)
- Humpback chub (*Gila cypha*, endangered)
- Bonytail chub (*Gila elegans*, endangered)

The Moffat Project will deplete an additional 15, 121 AF of water from the upper Colorado River Basin. The USFWS has determined that projects that fit under the umbrella of the Colorado River Programmatic BO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. Denver Water has already signed a Recovery Agreement and will need to provide a one-time monetary contribution to help fund its share of the recovery actions.

Table 9-1 provides a list of USFS Region 2 sensitive species relevant to the ARNF, along with a description of general habitat and indication of whether the species is addressed in detail for the Gross Reservoir study area and/or the Fraser and Williams Fork River Valleys.

For Gross Reservoir, species are evaluated in detail if suitable habitat is present. The analysis of each species includes a description of status, distribution and habitat; occurrence in the study area; effects of the Proposed Action and other action alternatives (including mitigation); and an impact summary. For the Fraser and Williams Fork River Valleys, sensitive species that are dependent on aquatic or riparian habitat are analyzed in detail. Section 9.2 includes analysis of 13 species, including 7 sensitive animal species and 6 sensitive plant species.

9.1 GROSS RESERVOIR

Detailed analysis is provided below for 22 species, including 10 animal species and 12 plant species. Of the 10 animal species, the Proposed Action and action alternatives may impact 8 of them, and would have no impact to northern leopard frog and black swift. For the 8 affected species, all of the action alternatives may cause minor short-term impacts to individuals, but are not likely to result in a loss of viability on the USFS planning area nor cause a trend to Federal listing or loss of species viability rangewide. These species include northern goshawk, olive-sided flycatcher, American peregrine falcon, bald eagle, flammulated owl, American three-toed woodpecker, Townsend's big-eared bat, and fringed myotis. Mitigation for nesting sensitive bird species is described in Section 13 and would include clearing of trees outside of the breeding season. If clearing would occur within the breeding season, nest surveys would be conducted to ensure that no active nests would be affected. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting.

The Proposed Action and other action alternatives would have no impact on any of the plant species, including park milkvetch, rock cinquefoil, dwarf raspberry, Selkirk's violet, upswept moonwort, prairie moonwort, narrowleaf grapefern, Paradox moonwort, yellow lady's slipper, stream orchid, and white adder's mouth orchid. One species, forkleaved moonwort, is no longer considered a valid species.

Table 9-1
USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Amphibians							
Boreal toad	<i>Anaxyrus boreas boreas</i> (<i>Bufo boreas boreas</i>)	SE	Wetlands, ponds, and riparian areas. Usually between 8,000 and 11,940 feet elevation.	No	No suitable habitat	Yes	
Northern leopard frog	<i>Lithobates pipiens</i>	SC	Wetlands, pond, and riparian areas.	Yes		Yes	
Wood frog	<i>Lithobates sylvatica</i>	SC	Wooded habitats, including the edges of ponds and streams and willow thickets and grass/willow/aspen associations.	No	Not in known range	No	Not in known range
Birds							
Northern goshawk	<i>Accipiter gentilis</i>		Mature forest generalist. Commonly nest in the lower portions of mature Douglas-fir, ponderosa pine, lodgepole pine, or aspen canopies.	Yes		No	Not dependent on aquatic or riparian habitat
Boreal owl	<i>Aegolius funereus</i>		Mature spruce/fir and mixed conifer forested areas with preference for wet situations (bogs or streams) for foraging.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Cassin’s sparrow	<i>Aimophila cassinii</i>		Open grassland and short-grass plains with scattered bushes or shrubs.	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Grasshopper sparrow	<i>Ammodramus savannarum</i>		In Colorado, almost exclusively prefer prairie grasslands that contain some degree of shrubs or tall plants (e.g., rabbitbrush or saltbush).	No	No suitable habitat	No	No suitable habitat
Burrowing owl	<i>Athene cunicularia</i>	ST	Open grasslands, especially prairie, and plains, sometimes in open areas. Nests in abandoned burrow.	No	No suitable habitat	No	No suitable habitat
American bittern	<i>Botaurus lentiginosus</i>		Summer resident of eastern plains and mountain parks. Inhabits wetlands with tall emergent vegetation.	No	No suitable habitat	Yes	
Ferruginous hawk	<i>Buteo regalis</i>	SC	Open grasslands and shrub-steppe communities.	No	No suitable habitat	No	No suitable habitat
McCown's longspur	<i>Rhynchophanes mccownii</i>		Sparse short-grass plains, plowed and stubble fields, and areas of bare or nearly bare ground with little litter.	No	No suitable habitat	No	No suitable habitat
Chestnut –collared longspur	<i>Calcarius ornatus</i>		Grasslands and deserts with primarily grasses and forbs.	No	No suitable habitat	No	No suitable habitat
Greater sage-grouse	<i>Centrocercus urophasianus</i>	SC	Uses a variety of habitats throughout the year, but the primary component necessary is a species of sagebrush (<i>Artemisia</i> spp.).	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Mountain plover	<i>Charadrius montanus</i>	SC	Inhabits flat, open, arid habitats with very short vegetation.	No	No suitable habitat	No	No suitable habitat
Black tern	<i>Chlidonias niger</i>		Associated with aquatic habitats containing emergent vegetation on the plains and in mountain parks.	No	No suitable habitat	No	No suitable habitat
Northern harrier	<i>Circus cyaneus</i>		Typically inhabits grasslands, croplands, wetlands, and mountain sagebrush; foraging over tall, thick cover. Occasionally found in alpine tundra.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Yellow-billed cuckoo	<i>Coccyzus americanus</i> (western Distinct Population Segment)	SC	Prefer lower elevations with large riparian habitats that contain cottonwood and willow trees and have dense understory foliage. Uncommon resident of Colorado (USFWS 2009a).	No	No suitable habitat	No	No suitable habitat
Olive-sided flycatcher	<i>Contopus cooperi</i>		Mature spruce-fir or mixed-conifer forests with a preference for the ecotone of natural openings, stream edges, wildfire areas with standing dead trees.	Yes		No	Not dependent or aquatic or riparian habitat

Table 9-1 (cont.)
USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Black swift	<i>Cypseloides niger</i>		Nests only on sheer cliffs near or behind waterfalls or in dripping caves.	Yes		No	Not dependent on aquatic or riparian habitat
American peregrine falcon	<i>Falco peregrinus anatum</i>	SC	Cliff habitat with suitable ledges for nest construction; usually at least 200 feet high.	Yes		Yes	
Bald eagle	<i>Haliaeetus leucocephalus</i>	SC	Nest in large and mature cottonwood or pines. Occur on plains, river systems and mountain parks. In winter scavenge lake shores and rivers for food.	Yes		Yes	
White-tailed ptarmigan	<i>Lagopus leucurus</i>		Inhabits alpine tundra; may winter below tree line in areas with willows or alders near alpine habitats.	No	No suitable habitat	No	No suitable habitat
Loggerhead shrike	<i>Lanius ludovicianus</i>		Mainly an eastern plains species in Colorado, often in open habitats with trees less than 15 feet for nesting.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Lewis's woodpecker	<i>Melanerpes lewis</i>		Open pine forests, burnt over areas with snags and stumps, riparian and rural cottonwoods, and pinyon-juniper woodlands.	No	Not in known range	No	Not dependent on aquatic or riparian habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Long-billed curlew	<i>Numenius americanus</i>	SC	Summer resident on the southeastern plains. Historically occurred in mountain parks and valleys.	No	No suitable habitat	No	Not in known range
Flammulated owl	<i>Psilosops (Otus) flammeolus</i>		Open forest, brush, or dense foliage. Secondary cavity nester. Primarily associated with mature open ponderosa pine forests.	Yes		No	Not dependent on aquatic or riparian habitat
American three-toed woodpecker	<i>Picoides dorsalis</i>		Primarily associated with spruce-fir forests; dependent upon bark beetle populations for food. Responsive to recently burned areas.	Yes		No	Not dependent on aquatic or riparian habitat
Purple martin	<i>Progne subis</i>		In Colorado, nests mainly in old growth aspen on western slope, occurs over riparian areas, open agricultural areas and reservoirs during migration.	No	No suitable habitat	No	No suitable habitat
Brewer's sparrow	<i>Spizella breweri</i>		Typically associated with big sagebrush, but may occasionally inhabit mountain shrub communities and willows.	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)
USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Insects							
Hudsonian emerald	<i>Somatochlora hudsonica</i>		Prefers deep, sedge-bordered lakes and ponds. They may also be found at boggy slow streams, ditches, and sloughs.	No	No suitable habitat	No	Not known to occur in the study area
Regal fritillary butterfly	<i>Speyeria idalia</i>		Wet meadows and non-degraded prairies near marshes with abundant nectar sources.	No	No suitable habitat	No	Not known to occur in the study area
Invertebrates							
Rocky Mountain capshell	<i>Acroloxus coloradensis</i>	SC	Known in CO from a small number of lakes between 8,800 and 9,800 feet.	No	No suitable habitat	No	Not known to occur in the study area
Fish							
Mountain sucker	<i>Catostomus platyrhynchus</i>	SC	Lotic water, from small montane streams to large rivers. Have been collected in lakes and reservoirs. Common in steams with low gradient segments that consist of a mix of riffles, pools, and runs.	No	Not in known range	No	Not known to occur in the study area
Lake chub	<i>Couesius plumbeus</i>	SE	Found in large lakes and rivers. Prefer clear water and gravel bottoms of glacial scour lakes and tributary rivers that feed into them.	No	Not in known range	No	Not known to occur in the study area

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Colorado River cutthroat trout	<i>Oncorhynchus clarkii pleuriticus</i>	SC	Steep cold water streams and rivers with well vegetated stream banks and deep pools.	No	Not in known range	Yes	
Mammals							
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SC	Forages in semi-desert shrublands, pinyon-juniper woodlands and open montane forests. Roosts in caves, mines and mature forests.	Yes		No	Not dependent on aquatic or riparian habitat
White tailed prairie dog	<i>Cynomys leucurus</i>		Inhabits open shrublands, semidesert grasslands, and open valleys. Lives at higher elevations and in meadows with more diverse grass.	No	No suitable habitat	No	No suitable habitat
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	SC	Dry, flat or gently sloping, open grasslands with low, relatively sparse vegetation and fine to medium textured soils.	No	No suitable habitat	No	No suitable habitat
North American wolverine	<i>Gulo gulo</i>	SE	Rare inhabitant of alpine and subalpine habitats. Considered extirpated by the CPW. In 2009, researchers tracked a wolverine from Grand Teton National Park into north central Colorado; the first confirmed occurrence in 90 years.	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)
USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
River otter	<i>Lontra canadensis</i>	ST	Dependent on abundant fish or crustacean populations and streams or rivers with a minimum flow of approximately 10 cubic feet/second.	No	Not in known range	Yes	
American marten	<i>Martes americana</i>		Occupies high elevation forests, but may rarely occur in lower elevation montane forests. Mesic, mature to old-growth forest with moderate to high canopy cover and abundant structure at ground level are preferred.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Fringed myotis	<i>Myotis thysanodes</i>		Uncommon associate of low elevation shrub, pinyon-juniper, or ponderosa forests, often where caves or mines exist (usually below 7,500 feet).	Yes		No	Not dependent on aquatic or riparian habitat
Rocky Mountain bighorn sheep	<i>Ovis canadensis canadensis</i>		Open areas with grass and low shrubs, near escape terrain and topographic relief.	No	Not known to occur	No	Not dependent on aquatic or riparian habitat
Pygmy shrew	<i>Sorex hoyi montanus</i>		Subalpine, prefer areas interspersed with wetlands and dry upland forests.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Swift fox	<i>Vulpes velox</i>	SC	Open prairie and arid plains.	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Plants – dicots							
Sea Pink (Siberian sea thrift)	<i>Armeria maritima</i> ssp. <i>sibirica</i>	G5T5/S1	Alpine; tundra, grassy slopes; 11,900-13,000 feet. Nearest location is Hoosier Ridge in Park County.	No	No suitable habitat	No	No suitable habitat
Dwarf milkweed	<i>Asclepias uncialis</i>	BLM, G3G4T2 T3/S2	Primarily in the Central and Southern Shortgrass Prairie ecoregions. In areas that are typically level to gently sloping terrain without notable micro-topographic features.	No	No suitable habitat	No	No suitable habitat
Park milkvetch	<i>Astragalus leptaleus</i>	G4/S2	Montane; sedge meadows, grassy stream banks; 7,500-10,000 feet. Occurs over Quaternary alluvium and older gravels.	Yes		Yes	
Sandhill goosefoot	<i>Chenopodium cycloides</i>	G3G4/S1	Sandy soils, often around the edges of blowouts in sand dunes, 3,800-5,700 feet elevation in Colorado.	No	No suitable habitat	No	No suitable habitat
Clawless draba	<i>Draba exungiculata</i>	G2/S2	Alpine; talus slopes, fell fields; 11,500-14,000 feet.	No	No suitable habitat	No	No suitable habitat
Gray’s peak whitlow-grass	<i>Draba grayana</i>	G2/S2	Alpine, subalpine; tundra, gravelly slopes; 11,000-14,000 feet.	No	No suitable habitat	No	No suitable habitat
Roundleaf sundew	<i>Drosera rotundifolia</i>	G5/S2	Subalpine; peatmats, fens; 9,100-9,800 feet.	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)
USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Dropleaf buckwheat	<i>Eriogonum exilifolium</i>	G3/S2	Flat to moderately sloping barren areas in shrub-steppe and open woodland, 6,090 to 8,800 feet.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Scarlet gilia	<i>Ipomopsis aggregata</i> ssp. <i>weberi</i>	G5T2/S2	Open sites in sagebrush, snowberry, shrubby serviceberry, and chokecherry.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Colorado tansy-aster	<i>Machaeranthera coloradoensis</i>	G5/S2	Alpine, subalpine; park grasslands, scree slopes, dry tundra; 7,600-13,000 feet.	No	No suitable habitat (target species in survey)	No	Not dependent on aquatic or riparian habitat
Rocky Mountain monkeyflower	<i>Mimulus gemmiparus</i>	G1/S1	Subalpine, montane; seepages, wet banks; 8,400-11,120 feet.	No	No suitable habitat (target species in survey)	No	Not known to occur in Grand County
Kotzebue's grass of Parnassus	<i>Parnassia kotzebuei</i>	G5/S2	Alpine, subalpine; wet rocky areas, moss mats; 10,000-12,500 feet.	No	No suitable habitat	No	No suitable habitat
Harrington Penstemon	<i>Penstemon harringtonii</i>	G3/S3	Open sagebrush shrublands on gentle slopes; 6,400-9,400 feet.	No	No suitable habitat	No	Not dependent on aquatic or riparian habitat
Rock cinquefoil	<i>Potentilla rupincola</i>	G2/S2	Subalpine, montane; granitic and schist outcrops on coarse shallow soils, exposed sites; 6,500-11,000 feet.	Yes		No	Not dependent on aquatic or riparian habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Greenland primrose	<i>Primula egalikensis</i>	G4/S2	Extreme rich fens 9,000-10,000 feet in Colorado.	No	No suitable habitat (target species in survey)	No	Not known to occur in Grand County
Ice cold buttercup	<i>Ranunculus karelinii</i> [<i>R. gelidus</i> ssp. <i>Grayi</i>]	G4G5/S1	Alpine; scree slopes, dry rocky areas; 12,000-14,100 feet.	No	No suitable habitat	No	No suitable habitat
Dwarf raspberry	<i>Rubus arcticus</i> var. <i>acaulis</i>	G5T5/S1	Wetlands; willow carrs, mossy stream sides; 8,600-9,700 feet.	Yes		Yes	
Silver willow	<i>Salix candida</i>	G5/S2	Foothills, montane; rich fens, pond edges, permanently saturated peatlands; 8,800-10,600 feet.	No	No suitable habitat (target species in survey)	Yes	
Autumn willow	<i>Salix serissima</i>	G4/S1	Montane; calcareous fens, permanently saturated peatlands; 7,800-9,300 feet.	No	No suitable habitat (target species in survey)	Yes	
Lesser bladderwort	<i>Utricularia minor</i>	G5/S2	Low nutrient lakes and ponds, mostly in peatland.	No	No suitable habitat (target species in survey)	Yes	

Table 9-1 (cont.)
USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Selkirk's violet	<i>Viola selkirkii</i>	G5?/S1	Montane, subalpine; cold mountain forests; 8,500-9,100 feet in Colorado.	Yes		No	Not a wetland indicator and is not known to occur in Grand County.
Plants – ferns & allies							
Upswept moonwort (Triangle globe moonwort)	<i>Botrychium ascendens</i>		Mesic montane coniferous forest.	Yes		No	Not dependent on aquatic or riparian habitat
Prairie moonwort	<i>Botrychium campestre</i>	G3G4/S1	Primarily on well-drained dry-to-mesic soils in sunlit, non-forested habitats at low elevation.	Yes		No	Not dependent on aquatic or riparian habitat
Forkleaved moonwort	<i>Botrychium furcatum</i>	G1G2/S1 S2	Has been found in stabilized subalpine areas, 20 to 60 years after disturbance. As yet an undescribed entity.	Yes		No	Not dependent on aquatic or riparian habitat
Slender moonwort (Narrowleaf grapefern)	<i>Botrychium lineare</i>	G2?/S1	Montane, subalpine; grass/forb meadows, sagebrush, cirques; 7,900-11,000 feet.	Yes		No	Not dependent on aquatic or riparian habitat
Paradox moonwort	<i>Botrychium paradoxum</i>		Montane to subalpine grasslands or forb-dominated meadows.	Yes		No	Not dependent on aquatic or riparian habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
Plants – monocots							
Lesser panicled sedge	<i>Carex diandra</i>	G5/S1	Montane and subalpine fens; over 6,000 feet.	No	No suitable habitat (target species in survey)	Yes	
Livid sedge	<i>Carex livida</i>	G5/S1	Montane and subalpine fens over 6,400 feet.	No	No suitable habitat (target species in survey)	No	Not known to occur in Grand County
Yellow lady’s slipper	<i>Cypripedium calceolus</i> spp. <i>parviflorum</i>	G5/S2	Montane; subalpine; moist forest, aspen groves; 7,400-8,500 feet.	Yes		No	Not known to occur in Grand County
Stream orchid	<i>Epipactis gigantea</i>	G4/S1S2	Wet, calcareous areas; wet gravel, sand with high organic matter content; often near mineral hot springs; 4,800-8,000 feet.	Yes		No	Not known to occur in Grand County
Slender cottongrass (Slender bristlegrass)	<i>Eriophorum gracile</i>	G5/S1S2	Montane, subalpine; fens, wet meadows; 8,100-12,000 feet.	No	No suitable habitat	No	Not known to occur in Grand County
Hall’s fescue (Plains rough fescue)	<i>Festuca hallii</i>	G4/S1	Alpine, subalpine; tundra, dry grasslands; 11,000-12,000 feet.	No	No suitable habitat	No	No suitable habitat
Simple kobresia (simple bog sedge)	<i>Kobresia simpliciuscula</i>	G5/S2	Alpine; glacial outwash, fens, moist gravelly tundra; 9,600-12,800 feet.	No	No suitable habitat	No	No suitable habitat

Table 9-1 (cont.)

USFS Region 2 Regional Forester Sensitive Species (May 2009), Relevant to the Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Other Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Reason for Exclusion	Considered in Detail?	Reason for Exclusion
White adder's-mouth orchid	<i>Malaxis brachypoda</i>	G4?/S1	Foothills, montane; in mosses along streams; 7,200-8,000 feet.	Yes		No	Not known to occur in Grand County
Plants – non-vascular							
Peatmoss	<i>Sphagnum angustifolium</i>	G5/S2	Subalpine iron fens and fens, nine locations in Colorado.	No	No suitable habitat (target species in survey)	No	Not known or likely on Arapaho-Roosevelt NF*
Baltic sphagnum	<i>Sphagnum balticum</i>	G2G4/S1	Subalpine iron fens, two locations in Colorado.	No	No suitable habitat (target species in survey)	No	No suitable habitat

*Region 2 Sensitive species evaluation

Other Status (animals): SE = state endangered, SC = Colorado special concern

Other Status (plants): CNHP ranking system

G: based on range-wide status of a species

G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range).

G2 Imperiled globally because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Endangered throughout its range).

G3 Vulnerable throughout its range or found locally in a restricted range (21 to 100 occurrences). (Threatened throughout its range).

G4 Apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

T: used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.

S: based on the status of a species in Colorado..

S1 Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals, or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state).

S2 Imperiled in state because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it very vulnerable to extirpation from the state. (Endangered or threatened in state).

S3 Vulnerable in state (21 to 100 occurrences).

S4 Apparently secure; usually > 100 occurrence

9.1.1 Northern Leopard Frog (*Lithobates pipiens*)

Note: This species is also evaluated in Section 9.2.2 for the Fraser River/upper Williams Fork River Valleys.

Status, Distribution and Habitat

Northern leopard frog is a USFS Region 2 sensitive species and is listed as G5/S3 by the CNHP (2013). The population segment west of the Mississippi River recently was the subject of a 12-month review by the USFWS for being listed as threatened, but listing was determined to be not warranted (USFWS 2011). Northern leopard frogs occur across much of the northern U.S., southern Canada, and south to California, Arizona and Mexico in the west. They have been reported throughout Colorado except for the southeastern and east-central portions of the state at elevations ranging from 3,500 to above 11,000 feet (Hammerson 1999), but are currently considered to be uncommon and declining in Colorado (Smith and Keinath 2009). Northern leopard frogs breed in a variety of habitats that have slow moving or still water, that lack predaceous fish and other predators, and that have emergent vegetation such as sedges and rushes (USFWS 2009). They require deeper stream, pond, or lake habitats that do not freeze to the bottom and that are well-oxygenated for overwintering and adjacent wetlands and upland habitats for feeding. These frogs are usually found along the water's edge but they may roam long distances especially during wet weather. Northern leopard frogs are active on the Colorado plains from March to October or November. The breeding season is in April and May at lower elevations and May and June at higher elevations.

Occurrence in Study Area

Surveys for this species were conducted by the Corps in 2010 (Attachment B). The surveys found no northern leopard frogs or suitable breeding habitat and only limited areas of marginally suitable habitat for adult frogs. More information is provided in Attachment B.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Northern leopard frog is unlikely to occur in drainages and inlets along the reservoir, and was not found in surveys in 2010. Vegetation clearing and inundation of the expanded reservoir would remove marginally suitable habitat in these areas but is unlikely to affect the species. There would be no difference among the action alternatives.

Impact Summary

All action alternatives would have no impact on northern leopard frog at Gross Reservoir.

9.1.2 Northern Goshawk (*Accipiter gentilis*)***Status, Distribution and Habitat***

Northern goshawk is a USFS Region 2 sensitive species, is protected under the Migratory Bird Treaty Act, and is ranked as G5/S3B by CNHP (2013). It occurs on all continents in the northern hemisphere. In North America, this raptor species breeds throughout Canada and the northern and western U.S. and northern Mexico. Northern goshawk is a forest

generalist that uses a variety of forest types including ponderosa pine, mixed conifer and deciduous forests, spruce-fir, and aspen. Northern goshawks require large blocks of intact habitat for nesting and foraging. Breeding typically occurs from early March through late September. Stands used for nesting have a relatively high canopy cover and high density of large trees which may provide a favorable microclimate and protection against predators. Goshawk pairs alternate use of nests within the same territory from year to year. In addition, they are short distance migrants and may stay loosely tied to their nesting territories during the winter (Smith and Keinath 2004). The primary threat to this species is habitat alteration from timber harvest and fire management (Kennedy 2003).

Occurrence in Study Area

Surveys were conducted in 2010 by the Corps (see Attachment B). One northern goshawk was observed on the west side of the reservoir in 2010, but no nests were found. The surveys indicated that the study area around Gross Reservoir is used by the species, at least on Winiger Ridge. The Gross Reservoir study area seems to be limited in its potential as breeding habitat, largely because of the lack of tree stands with dense canopy cover that also occur on moderate terrain. Dense stands of forest around Gross Reservoir typically are limited to steep, north-facing slopes, which are not typically used as nesting habitat by the northern goshawk. The study area likely provides suitable foraging or post-fledgling habitat, but the extent of use could not be confirmed by the 2010 study.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Proposed Action and action alternatives are unlikely to adversely affect nesting northern goshawk. No nests are known to occur and the area has limited potential as breeding habitat. In addition, disturbance to nesting goshawks would be avoided or minimized by the methods described in Section 13. Trees would be cleared outside the nesting season or surveys would be used to identify active nests and apply buffer zones and seasonal restrictions on activity in the vicinity of the nest. CPW recommends a seasonal restriction on human activity within 0.5 mile of active nests from March 1 through September 15 (CPW 2008).

The study area likely provides suitable foraging and/or post-fledging habitat, at least on Winiger Ridge. Construction activities could temporarily displace individuals during operation of heavy equipment and removal of timber, and inundation of the reservoir would result in a loss of foraging habitat. The Proposed Action would result in the loss of about 473 acres of forested habitat, which may affect the availability of prey. This habitat is distributed around the existing reservoir, and an unknown proportion may be used by northern goshawk. Goshawk home range size reported in North American is about 1,235 to 9,885 acres (about 1.93 to 15.4 square miles) (Kennedy 2003), and therefore the loss of habitat may represent a large or small portion of a foraging territory. Displacement during construction and loss of habitat from inundation may have minor to moderate effects to one pair of northern goshawk, but it not likely to affect regional populations. The estimated northern goshawk population in Colorado is 1250 breeding pairs (Kingery 1998).

Impact Summary

Mitigation is described in Section 13 and would include clearing of trees outside of the breeding season. If clearing would occur within the breeding season, nest surveys would be conducted to ensure that no active nests would be affected. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting.

All action alternatives may cause minor short-term impacts to individual northern goshawks, but is not likely to result in a loss of viability on the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.1.3 Olive-sided Flycatcher (*Contopus cooperi*)***Status, Distribution and Habitat***

Olive-sided flycatcher is a USFS Region 2 sensitive species and it protected under the Migratory Bird Treaty Act. It is not included on the CNHP list of tracked species in Colorado (CNHP 2013). It breeds in the boreal forests of Canada and the northern U.S., extending south in riparian, montane and subalpine forests of the Rocky Mountains (Kotliar 2007). Olive-sided flycatchers are neotropical migrants and winter mostly in northern South America and along the Andes Mountains. In Colorado, they breed primarily in mature spruce-fir and Douglas-fir forests, and less often in other types of forests. These flycatchers generally live in forests with snags and forest openings consisting of natural clearings, stream or lake shores, burned areas or logged areas with standing dead trees. Snags are used as hunting perches, and this species feeds almost exclusively on flying insects. Olive-side flycatchers occur in Colorado mostly from about mid-May to mid-September and are relatively wide-spread but localized in distribution.

Occurrence in Study Area

The Gross Reservoir study area is within the general range of this species, and has potential habitat for olive-side flycatchers. No olive-sided flycatchers were observed during field surveys, but field work did not focus on this species, and it is expected to occur.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Construction, specifically removal of trees, has the potential to directly affect active nests if tree removal occurs during the breeding season. In addition, although this species is not generally sensitive to human activity (Kotliar 2007), construction noise, vehicle movement, and human presence could disturb or displace nesting birds adjacent to the construction area. Removal of trees and inundation of the reservoir would result in a long-term loss of potential habitat.

As with other migratory bird species, impacts to nesting birds would be minimized by avoidance of tree clearing between March 1 and July 31, which encompasses the breeding season of June 1 through July 31 in Colorado (Nelson and Leukering 2007). Pre-construction surveys for nests of these and other migratory bird species would be conducted if tree clearing were scheduled between March 1 and July 31. Disturbance and removal of habitat would affect individual flycatchers, but would have negligible effects on regional populations.

Impact Summary

Mitigation is described in Section 13 and would include clearing of trees outside of the breeding season. If clearing would occur within the breeding season, nest surveys would be conducted to ensure that no active nests would be affected. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting.

All action alternatives may cause minor short-term impacts to individual olive-side flycatchers, but is not likely to result in a loss of viability on the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.1.4 Black Swift (*Cypseloides niger*)***Status, Distribution and Habitat***

Black swifts are a USFS Region 2 sensitive species, are protected under the Migratory Bird Treaty Act, and are ranked as G4/S3B by CNHP (2013). They are summer residents of Colorado, and have a spotty breeding range extending from southeastern Alaska to the West Indies and Central America. They nest only on wet cliff faces, and most of the known nesting sites in Colorado are at waterfalls. Recent studies in Colorado have found over 100 nesting colonies in the mountainous central and western portions of the state (Wiggins 2004). Nests are usually in recesses or ledges with dripping water in shaded areas, often near waterfall spray. Centers of concentration of known nest sites include the San Juan Mountains and Rocky Mountain National Park. Little is known about movements away from the nesting areas but they appear to forage at great distances from the nest and often at high elevation. They primarily feed on winged ants, termites, and other flying insects. Black swifts lay a single egg and have a prolonged period of incubation and nestling growth. Swifts appear to be a relatively long-lived species with a fixed clutch size of one egg and an unusually prolonged and late breeding season. Nestling growth is slow, with the nestling typically leaving the nest 47 to 50 days after hatching. They appear to be a long-lived species with a low reproductive rate.

Occurrence in Study Area

A small waterfall is located in Forsythe Gulch a short distance upstream of the reservoir. There are no reports of black swift nesting at this location. No other suitable breeding habitat is present. Black swifts may occasionally forage over the Gross Reservoir study area.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The action alternatives would have no effect on black swift at Gross Reservoir. Construction activities would not affect foraging or nesting.

Impact Summary

All action alternatives would have no impact on black swift.

9.1.5 American Peregrine Falcon (*Falco peregrinus anatum*)

Note: This species is also evaluated in Section 9.2.4 for the Fraser River/upper Williams Fork Rivers.

Status, Distribution and Habitat

Peregrine falcons were formerly listed as threatened, and are currently a USFS Region 2 sensitive species and are ranked as G4T4/S2B by CNHP (2013). Peregrine falcons have a world-wide range, except Antarctica. They breed from Alaska south into the Rocky Mountains, including western Colorado. They nest on high cliffs overlooking open country or water. Their nest is a scrape of loose soil or sand. After a drop in population from eggshell thinning, recovery efforts resulted in Colorado populations growing from 8 known in 1982 to 115 in 2001 (Craig and Enderson 2004). They feed on rodents and small to medium-sized birds. Most of the breeding peregrine falcons migrate south for the winter; migrating and wintering birds forage mostly over reservoirs, rivers and marshes.

Occurrence in Study Area

Although the Gross Reservoir study area has large areas of rocky terrain, there are no prominent cliffs that appear to be suitable for nesting peregrine falcons, and no nest sites have been identified. Peregrine falcons may occur during foraging or migration but are unlikely to occur regularly. Known nesting sites are located about 3 miles away.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Construction and operation of Gross Reservoir is expected to have no little or no effect to peregrine falcons. Individual foraging or migrating birds could potentially be displaced by construction activities. There would be no effect to nest sites.

Impact Summary

All action alternatives may cause minor short-term impacts to individual peregrine falcon, but is not likely to result in a loss of viability in the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.1.6 Bald Eagle (*Haliaeetus leucocephalus*)

Note: This species is also evaluated in Section 9.2.5 for the Fraser River/upper Williams Fork Rivers.

Status, Distribution and Habitat

Bald eagle was a threatened species under the ESA until 2007. It is ranked as G5/S1B,S3N by CNHP (2013). Currently, bald eagles are protected under both the Bald and Golden Eagle Protection Act and as a USFS Region 2 sensitive species. In Colorado, breeding and wintering populations occur mostly along major riparian corridors and near large bodies of water; although they may occur in upland areas where they feed on species such as prairie dogs and deer and elk carcasses. Bald eagles build large nests in trees and often use the same nest year after year. Nests and roosts are usually located in tall trees near water in areas free of human activity and development. In Colorado, nest trees are located in

various forest types from old growth ponderosa pine to linear groups of riparian woodland (Kingery 1998). Bald eagles pair for life and typically return to the same breeding territory year after year. Nests are usually located within 2.5 miles of large lakes, reservoirs, major rivers or estuaries where there are adequate prey, perching sites, and nesting sites.

Wintering populations of bald eagle are highest from November through early March in Colorado. In winter, bald eagles often congregate at roost sites that are used for sleeping and for protection from winter storms and they may forage at open water, in upland areas, and on frozen lakes for fish frozen into the ice.

Occurrence in Study Area

A bald eagle was observed flying over Gross Reservoir during site visits conducted in September 2005. In addition, commenters on the DEIS mentioned seeing bald eagles at Gross Reservoir. Natural Diversity Information Source (NDIS 2011) does not include the Gross Reservoir study area in maps of winter foraging, summer foraging, winter range, and winter concentration areas. Based on this information, bald eagles may occur occasionally but are not known to nest or roost in the Gross Reservoir study area.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Gross Reservoir does not provide important habitat for bald eagle and they do not occur regularly. During construction, disturbance from equipment operation and earth-moving activities may temporarily disturb foraging bald eagles. Additionally, construction disturbance may affect availability of prey species. Construction of the enlarged reservoir and associated increased surface water is unlikely to adversely impact bald eagles.

Impact Summary

All action alternatives may cause minor short-term impacts to individual bald eagles, but is not likely to result in a loss of viability on the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.1.7 Flammulated Owl (*Psiloscops [Otus] flammeolus*)

Status, Distribution and Habitat

Flammulated owl is a USFS Region 2 sensitive species, and is protected as a migratory bird species. It is not included on the CNHP list of tracked species (CNHP 2013). It is the second smallest North American owl. This species is a neotropical migrant with their range extending from British Columbia south through the western U.S. mountains to El Salvador. The owls are present in Colorado from late April to mid-October. They occur regularly in the montane regions of Colorado from 6,000 to 10,000 feet elevation, in aspen and mature and old-growth ponderosa pine and ponderosa pine-Douglas-fir forests that are often mixed with mature aspen (Andrews and Righter 1992; Kingery 1998). They are nearly absent from dense forests (McCallum 1994). These owls are secondary cavity nesters and typically use holes excavated by northern flickers or other woodpeckers. Flammulated owls occupy breeding territories of 90 to 140 acres, and may occur in loose colonies with large areas of unoccupied habitat between colonies. They forage in open forests and use

brush or dense foliage or mistletoe for roosting. They are quiet and difficult to find but appear to be relatively common (Andrews and Righter 1992).

Occurrence in Study Area

Surveys for flammulated owl were conducted at Gross Reservoir in 1997 and none were observed (FERC and USDA Forest Service 1999). However, as noted above, they are difficult to find. The ponderosa pine forests in the Gross Reservoir study area provide suitable habitat for flammulated owls and they are likely to occur.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

This species is likely to occur in the Gross Reservoir study area, because the study area is within the known range and includes typical habitat. Tree clearing and other construction activities have the potential to disturb and displace flammulated owls, although they are reported to be tolerant of human activity (McCallum 1994). Tree clearing would be avoided between March 1 and July 31, which generally covers the nesting period, although some young may fledge in early August. Surveys for flammulated owls would be conducted prior to tree clearing if clearing is scheduled to occur between May 10 and August 10, and seasonal buffer zones would be established around nests. Flammulated owls are neotropical migrants that are on their breeding range in Colorado from about late April/early May through October, and are actively nesting in May, June and July. Construction activities would occur during the daytime and would not affect nocturnal foraging.

Clearing and inundation would result in the loss of 473 acres of forest, about half of which consists of mature ponderosa pine and Douglas-fir forest. The Proposed Action would affect only 1 acre of old growth forest preferred by this species. Densities of flammulated owls are typically less than one territory per 100 acres (McCallum 1994), and therefore the impact area is equivalent in size to 1 to 2 territories, although it could contain portions of several territories. Home ranges of flammulated owls have been reported as 27-45 acres in one study in central Colorado (Linkhart *et al.* 1998), but territories were not contiguous and the study area included a large component of old ponderosa pine and Douglas-fir. Removal of trees followed by inundation would have negligible to moderate effects to flammulated owls in and near the construction area, but would not be likely to affect regional populations. The estimated population in Colorado is 1,800 to 5,000 pairs (Kingery 1998).

Impact Summary

Mitigation is described in Section 13 and would include clearing of trees outside of the breeding season. If clearing would occur within the breeding season, nest surveys would be conducted to ensure that no active nests would be affected. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting.

With the proposed mitigation, the proposed Project may create minor short-term impacts on individual flammulated owls, but would not likely result in a loss of viability on the USFS planning area or cause a trend to Federal listing or a loss of species viability range wide.

9.1.8 American Three-toed Woodpecker (*Picoides dorsalis*)***Status, Distribution and Habitat***

American three-toed woodpecker is a USFS Region 2 sensitive species, and is protected as a migratory bird species. It is not included on the CNHP list of tracked species (CNHP 2013). This species occurs in the Rocky Mountains, and throughout the boreal forests of Alaska and Canada. In Colorado, they primarily inhabit spruce-fir forests and burned areas, but may also occur in ponderosa pine, Douglas-fir, and lodgepole pine forests when insect populations are high (Andrews and Righter 1992; Kingery 1998). This woodpecker species typically occurs from 8,000 to 11,500 feet during the summer and down to 5,500 feet in the winter. Most nesting occurs in subalpine conifer forests. However, nesting has been reported from 7,000 to 12,000 feet (Kingery 1998) and occasionally in aspen trees. They occupy cavity nests from late May to early August. The primary food source is wood-boring insects; thus, American three-toed woodpeckers are common in burned areas and in beetle-killed forests for the first several years after tree death.

Occurrence in Study Area

This species was observed about a mile west of the Gross Reservoir study area in 1999 where a prescribed burn had been conducted the previous year (FERC and USDA Forest Service 1999). Typical habitat for northern three-toed woodpecker does not appear to be present at Gross Reservoir, and no areas of dead or burned forest were observed during the field studies. They could potentially occur at the time of construction if there are changed conditions favorable to this species, such as areas of beetle kill.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

If present, construction could temporarily displace individuals during operation of heavy equipment, and inundation of the reservoir could result in a loss of potential habitat. As with other migratory bird species, impacts to nesting birds would be minimized by avoidance of tree clearing between March 1 and July 31, which encompasses the breeding season. Pre-construction surveys for nests of these and other migratory bird species would be conducted if tree clearing were scheduled between March 1 and July 31.

Impact Summary

Mitigation is described in Section 13 and would include clearing of trees outside of the breeding season. If clearing would occur within the breeding season, nest surveys would be conducted to ensure that no active nests would be affected. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting.

With the proposed mitigation, the Project may create minor short-term impacts on individual northern three-toed woodpeckers, but would not likely result in a loss of viability on the USFS planning area or cause a trend to Federal listing or a loss of species viability range wide.

9.1.9 Townsend's Big-eared Bat (*Corynorhinus townsendii*)***Status, Distribution and Habitat***

Townsend's big-eared bat is a USFS Region 2 sensitive species and the subspecies in Colorado is ranked as G4T4/S2 by CNHP (as *Plecotus townsendii pallescens*). This is a medium-sized bat that occurs in a large portion of the western United States (U.S.) and Mexico, and in two disjunct and isolated populations in the eastern and central parts of the U.S. (Gruver and Keinath 2006). In Colorado, Townsend's big-eared bat has been found throughout the western half of the state. Its distribution is patchy and it is typically not abundant. They typically roost in caves and mines, which may be located in a wide variety of vegetation types, including montane conifer forest. Hibernation caves have stable, cold temperatures that remain above freezing, and moderate airflow. Maternity roosts appear to be selected based on temperature. Townsend's big-eared bat is expected to forage mostly in and near vegetation, and suitable foraging habitat appears to include a mixture of forested and edge habitats including riparian zones. Individuals and colonies tend to use the same foraging areas repeatedly. They are relatively sedentary and do not have long distance migrations.

Occurrence in Study Area

There are no known caves or mines in the Gross Reservoir study area, and roosting habitat is unlikely to be present. The Gross Reservoir study area does have suitable foraging habitat including forested and riparian habitats. There is a good potential for occurrence, because this species has been reported at several locations in western Boulder County (Gruver and Keinath 2006).

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Impacts to Townsend's big-eared bat would be limited since these species forage at night. However, individuals at day roosts located near construction activity may be displaced to other areas. Known Townsend's big-eared bat roosts are located approximately 2 miles from the reservoir site and therefore construction and operation would not impact roosting individuals.

Impact Summary

The Project may create minor short-term impacts on individual Townsend's big-eared bats, but would not likely result in a loss of viability on the USFS planning area or cause a trend to Federal listing or a loss of species viability range wide.

9.1.10 Fringed Myotis (*Myotis thysanodes*)***Status, Distribution and Habitat***

Fringed myotis is a USFS Region 2 sensitive species, and is ranked as G4G5/S3 by the CNHP (2013). It occurs in western North America from southern British Columbia to southern Mexico (Keinath 2004). Although relatively rare overall, it can be locally abundant. They occur in a number of vegetative habitats, but appear to be most common in dry areas where open areas such as grassland or xeric shrubland are interspersed with

mature woodlands of ponderosa pine, pinyon-juniper, or other species. They range in elevation up to about 7,500 feet elevation in Colorado (Fitzgerald et al 1994), and need a regular source of water. Fringed myotis use caves, mines and buildings as maternity roosts, solitary day and night roosts, and hibernacula. They also roost under bridges, in rock crevices, and under bark or in hollow trees, especially decayed ponderosa pine and Douglas-fir. Snags used for roosting are generally taller and have a larger diameter than surrounding trees, and are surrounded by mature forest. Hibernacula are usually in caves or mines with relatively little variation in temperature. Recorded distances between roosting and foraging sites range from 0.6 to 25 miles.

Occurrence in Study Area

No specific information is available for the study area, and there are no recorded observations within Boulder County (Keinath 2004). The study area does not include any known caves or mines that could be used as maternity roosts or hibernacula, but suitable foraging and day roosting habitat is present. The study area has a large amount of potential day and night roosting habitat in the form of rock crevices, and scattered ponderosa pine and Douglas-fir snags. In addition, all of the study area has close proximity to still water.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would not affect known maternity roosts or hibernacula, but could cause impacts to habitat, including possible loss of solitary roost sites. Impacts to foraging fringed myotis would be limited because these species forage at night. However, individuals at day roosts located near construction activity may be displaced to other areas.

Impact Summary

All of the action alternatives may create minor short-term impacts on individual fringed myotis, but would not likely result in a loss of viability on the USFS planning area or cause a trend to Federal listing or a loss of species viability range wide.

9.1.11 Park Milkvetch (*Astragalus leptaleus*)

Note: This species is also evaluated in Section 9.2.8 for the Fraser River/upper Williams Fork Rivers.

Status, Distribution and Habitat

Park milkvetch is a USFS Region 2 sensitive species and is ranked as G4/S2 by the CNHP (2013). Its total range extends from Montana and Idaho to central Colorado, but occurrences are scattered and generally isolated (Ladyman 2006a). It appears to be most abundant in Idaho. In Colorado, it has been found in Jackson, Chaffee, Larimer, Summit, Park, Gunnison, and possibly Eagle counties. It occurs in sedge-grass meadows and among streamside willows in the montane zone. All known occurrences in USFS Region 2 are above about 7,600 feet elevation. It appears to occupy edges of wet meadows and moist areas between saturated soils and drier uplands, and is considered an obligate wetland species. Recorded occurrences in Colorado are mostly from large mountain valleys, including North Park, Middle Park, South Park, Gunnison Basin, and San Luis Valley.

Occurrence in Study Area

There are no known occurrences of this species in Boulder County. It was included as a target species in botanical surveys conducted in the Gross Reservoir study area in 2010 (Attachment D), and was not found. Although the study area has habitat that appears generally suitable for this species, it does not have the landscape setting typical of occurrences of this species in Colorado. Based on the locations of recorded occurrences in Colorado, it appears unlikely that it would be found in the Gross Reservoir study area.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on Park milkvetch, for all alternatives.

Impact Summary

All action alternatives would have no impact on park milkvetch.

9.1.12 Rock Cinquefoil (*Potentilla rupincola*)***Status, Distribution and Habitat***

Rock cinquefoil is a USFS Region 2 sensitive species and is ranked as G2/S2 by the CNHP (2013). This species is known from 23 occurrences in four counties in the Front Range of north-central Colorado, including Park, Clear Creek, Boulder, and Larimer Counties (Anderson 2004). However, the occurrences in Clear Creek and Boulder County are historic and may be misidentified, and efforts to find populations in these counties have not been successful. The single historic population in Boulder County is from Eldora. The great majority of the known occurrences and population occurs in Larimer County. This species has mostly been found growing in cracks on granite rock outcrops between 6,500 and 10,900 feet in elevation. It has also been found on gravelly soils adjacent to outcrops and occurs in rocky areas that are unsuitable for forest growth. It only occurs on outcrops of granite or on metamorphic rocks that are chemically similar, such as schist, or on soils derived from these rocks.

Occurrence in Study Area

This species is not known to occur in the study area or in Boulder County, and is unlikely to occur. The bedrock in the Gross Reservoir study area is granodiorite, an intrusive rock similar to granite but different in chemical composition. The study area does contain numerous exposed bedrock outcrops that could be suitable habitat if they were granite. This species was included as a target species in the 2010 botanical surveys at Gross Reservoir but the survey was conducted too late for standard identification (Attachment D).

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project is expected to have no effect on Rock cinquefoil, for all action alternatives

Impact Summary

All action alternatives would have no impact on rock cinquefoil.

9.1.13 Dwarf Raspberry (*Rubus arcticus* var. *acaulis*, *Cylactis arctica* ssp. *acaulis*)

Note: This species is also evaluated in Section 9.2.9 for the Fraser River/upper Williams Fork Rivers.

Status, Distribution and Habitat

Dwarf raspberry is a USFS Region 2 sensitive species and is ranked as G5T5/S1 by the CNHP (2013). Dwarf raspberry is a small herbaceous raspberry that is perennial and rhizomatous and reproduces both vegetatively and by seed. It occurs in widely disjunct sites in North America and possibly Kamchatka (Ladyman 2006b). In North America, it has been found from Alaska through much of Canada to Washington, Colorado and Wyoming, Minnesota, Michigan and Maine. There are 10 documented sites in Colorado and Wyoming, including three sites on Arapaho National Forest lands in Grand County. In addition to the five sites in Colorado in Grand and Park Counties documented by Ladyman (2006b), the PLANTS database (NRCS 2011) reports that it has been recorded in Clear Creek County. An additional site near the Gross Reservoir study area was recorded by Rick Brune (Shapins Associates 2002), which is discussed in more detail below. There is apparently no herbarium documentation for this occurrence. Dwarf raspberry occurrences in USFS Region 2 are in the montane and sub-alpine zones at elevations of 7,000 to 9,700 feet. Vegetation types include *Salix planifolia*/*Carex [rostrata] utriculata* (plainleaf willow/beaked sedge), and *Picea engelmannii*/*Linnaea borealis* (Engelmann spruce/twinberry). Many of the recorded sites are fens, but the species does not appear to be restricted to fens. Dwarf raspberry is designated as an obligate wetland plant in Region 8.

Occurrence in Study Area

Rick Brune reported an occurrence of this species along Forsythe Gulch in 2002 upstream of Gross Reservoir (Shapins Associates 2002). He reported that at least 8 individuals were present. An attempt to re-find this population was made by the Corps in 2010 (Attachment C), but no evidence of this species was found at the GPS location recorded by Rick Brune. The URS survey was conducted later in the season when the species may have become dormant. The location that was searched was a mesic riparian area with mineral soils, and not typical of the habitats in which this species generally occurs. This species was also included as a target species in the 2010 surveys completed by Scott Smith (Attachment D). It was not found, and the habitat was reported as marginally suitable.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on dwarf raspberry. This species was not found during surveys of the Gross Reservoir study area in 2010. In addition, the site previously reported by Rick Brune in 2002 is about 600 feet upstream of the largest Gross Reservoir alternative and would not be affected by any of the action alternatives.

Impact Summary

All action alternatives would have no impact on dwarf raspberry.

9.1.14 Selkirks Violet (*Viola Selkirkii*)***Status, Distribution and Habitat***

Selkirk's violet is a USFS Region 2 sensitive species and is ranked as G5?/S1 by the CNHP (2013). It occurs in Eurasia and across Canada and the northern tier of states in the U.S., with disjunct populations in South Dakota, Colorado and New Mexico. In Colorado, it has been found in Larimer, Douglas, Elbert, and Custer Counties in Colorado (NRCS 2011). Some of the occurrences in Colorado may have been extirpated or are misidentifications, but there are confirmed extant populations in Rocky Mountain National Park and in the Rampart Range (Hornbeck *et al.* 2003; Kelso and Schurman 2003). In Colorado, its habitat has been identified as cold mountain forests, and moist woods and thickets at elevations of 8,500 to 9,100 feet (Spackman *et al.* 1997). In the Black Hills of South Dakota, it occurs on spruce dominated sites in cool shady ravines at elevations of 5,400 to 7,000 feet (Hornbeck *et al.* 2003). Occurrences there are in moist, mossy or grassy, sheltered microsites shaded by trees or rock outcrops, and often in areas with runoff from rock formations. It occurs most often in the bottoms of narrow, north-trending gullies and at the bases of north-facing cliffs. Elsewhere in its range, it occurs in deep moist shade often on beds of moss (Kelso and Schurman 2003).

Occurrence in Study Area

This species is not known to occur in the Boulder County or in the Arapaho & Roosevelt National Forests. Botanical surveys conducted in 2010 at Gross Reservoir did not find this species but were too late in the growing season to reliably locate it. The Gross Reservoir study area is more than 1,000 feet lower in elevation than sites in Colorado where it has been reported, and cold boreal forests are not present. Based on these considerations, Selkirk's violet is unlikely to occur in the Gross Reservoir study area.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project is expected to have no effect on Selkirk's violet, for all action alternatives.

Impact Summary

All action alternatives would have no impact on Selkirk's violet.

9.1.15 Upswept Moonwort (*Triangle globe moonwort, Botrychium ascendens*)***Status, Distribution and Habitat***

Upswept moonwort is a USFS Region 2 sensitive species. It has a global rank of G2G3 and is not a species tracked by the CNHP because it is not currently known to exist in Colorado (Beatty *et al.* 2003). Upswept moonwort has a wide range in western North America, from Alaska to California, Nevada, and Wyoming, but it has a small total population and occurs as widely scattered disjunct populations. It is known from four occurrences in Wyoming, including two in the Absaroka Mountains, one in the Wind River Range, and one in the Bighorn Mountains. In Wyoming, upswept moonwort has been found within short and tall riparian willow communities that have significant moss, gravel, and cobble groundcover at

8000 to 9000 feet elevation. Outside of USFS Region 2, they have been typically found in moist grassy areas resulting from hydrological disturbance.

Occurrence in Study Area

This species was included as a target species in botanical surveys of the Gross Reservoir in 2010 (Attachment D). It was not observed and the habitat is considered to be unsuitable.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect to upswept moonwort, for all alternatives.

Impact Summary

All action alternatives would have no impact on upswept moonwort.

9.1.16 Prairie Moonwort (*Botrychium campestre*)***Status, Distribution and Habitat***

Prairie moonwort is a USFS Region 2 sensitive species and is ranked as G3G4/S1 by the CNHP (2013). Prairie moonwort occurs across North America in 14 U.S. states and 5 Canadian provinces, but is most common in Iowa, Minnesota and Michigan (Anderson and Cariveau 2003). Populations are generally small and disjunct. In Colorado, prairie moonwort is known to occur at Bonny State Park, and has been reported to have been observed on Pawnee National Grassland. A specimen from Mount Evans (Echo Lake) was also identified as this species but has not been confirmed. More recently, two prairie moonwort were found on Guanella Pass (Anderson and Cariveau 2006). In USFS Region 2, this species mostly occurs in tallgrass, midgrass and shortgrass prairies and ponderosa pine parkland, and also has been observed in alpine tundra.

Occurrence in Study Area

There are no records of this species in Boulder County or within the Gross Reservoir study area, and typical habitat (prairie and parkland) is not present. It was included at target species in the 2010 botanical surveys at Gross Reservoir (Attachment D). It was not observed and the habitat was considered to be not suitable.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect to upswept moonwort, for all alternatives.

Impact Summary

All action alternatives would have no impact on prairie moonwort.

9.1.17 Forkleaved Moonwort (*Botrychium furcatum*)***Status, Distribution and Habitat***

Forkleaved moonwort is a USFS Region 2 sensitive species and is ranked as G1G2/S1S1 by the CNHP (2013). It does not appear to be a valid species; according to Farrar and Popovich (2010), specimens informally referred to as *Botrychium furcatum* have been combined into *Botrychium lineare*. *Botrychium furcatum* is not included on the Plants database (NRCS 2011), and is not on the current list of USFS Rocky Mountain Region sensitive species (USFS 2011).

Occurrence in Study Area

Not applicable.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Not applicable.

Impact Summary

Not applicable.

9.1.18 Narrowleaf Grapefern (*Botrychium lineare*)***Status, Distribution and Habitat***

Narrowleaf grapefern is a USFS Region 2 sensitive species and is ranked as G2?/S1 by the CNHP (2013). It occurs in Alaska, three provinces in Canada, and six western U.S. states including Colorado (NRCS 2011). Narrowleaf grapefern has been reported from eight sites in Colorado (Beatty et al 2003; Popovich 2004) but several are unconfirmed and several are historic sites where the species has not been observed in many years either because efforts to relocate the plants have been unsuccessful or the sites have not been revisited. The largest and best documented occurrence is at a site at 9,000 feet on Pikes Peak, where regular monitoring has reported between 1 and 53 individuals. There are two historic sites in Boulder County. In Colorado, narrowleaf grapefern mostly occurs in subalpine areas mostly along the Continental Divide in open meadows, rocky slopes, roadsides, and earthen dams (Farrar and Popovich 2010).

Occurrence in Study Area

This species was included as a target species in the 2010 botanical surveys at Gross Reservoir (Attachment D). It was not observed and the habitat was considered to be unsuitable. The Gross Reservoir study area is lower in elevation than the sites where it has been observed in Colorado. Based on the results of the survey, and its recorded distribution and habitat, this species is very unlikely to be present in the study area.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project is unlikely to have an effect on narrowleaf grapefern, for all action alternatives.

Impact Summary

All action alternatives would have no impact on narrowleaf grapefern.

9.1.19 Paradox Moonwort (*Botrychium paradoxum*)***Status, Distribution and Habitat***

Paradox moonwort is a USFS Region 2 sensitive species and is not included on the CNHP (2013). It occurs from British Columbia, Alberta, and Saskatchewan, south to Washington, Oregon, Idaho, Montana and Utah (NRCS 2011). There is also a recent report of its occurrence in Wyoming (Elliott and Elliott 2009) on a vegetated talus slopes at 9,600 feet. According to Farrar and Popovich (2010), there is one documented site in Colorado, a grassy subalpine slope near Crested Butte.

Occurrence in Study Area

This species was included as a target species in the 2010 botanical surveys at Gross Reservoir (Attachment D). It was not observed, and the habitat was considered to be unsuitable. The Gross Reservoir study area is more than 2,000 feet lower in elevation than the one site where it has been observed in Colorado. It is considered unlikely to be present based on survey results, and previously documented distribution and habitat.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on this species, for action alternatives

Impact Summary

All action alternatives would have no impact on paradox moonwort.

9.1.20 Yellow Lady's Slipper (*Cypripedium calceolus* spp. *parviflorum*, *C. parviflorum*)***Status, distribution and habitat***

American yellow lady's slipper is a USFS Region 2 sensitive species and is ranked as G5/S2 by the CNHP (2013). *Cypripedium parviflorum* occurs across the U.S. and Canada (NRCS 2011) and has recently been split from *Cypripedium calceolus*, which occurs in Eurasia (Mergen 2006). There are 224 recorded occurrences within USFS Region 2, of which 46 occur in Colorado. There are three known occurrences on the ARNF. In Colorado, this species has been found at elevations between 5,800 and 12,683 feet on various slopes and aspects, in aspen, ponderosa pine, Douglas-fir, narrowleaf cottonwood, lodgepole pine, and mixed spruce-fir and aspen.

Occurrence in Study Area

This species was included as a target species in the 2010 botanical surveys at Gross Reservoir (Attachment D). It was not found, though suitable habitat is present. This species has not been recorded in Boulder County. Based on the survey results and the absence of previous documentation of its occurrence, it is unlikely to be present in the Gross Reservoir study area.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project is unlikely to affect lesser yellow lady's slipper because it is not known to occur.

Impact Summary

All action alternatives would have no impact to Yellow lady's slipper.

9.1.21 Stream Orchid (*Epipactis gigantea*)***Status, Distribution and Habitat***

Stream orchid, also known as giant helleborine, is a USFS Region 2 sensitive species and is ranked as G4/S1S2 by the CNHP (2013). This species occurs in all of the western states as well as South Dakota, Oklahoma, Texas, and British Columbia (NRCS 2011). It is uncommon throughout its range but can be abundant locally in suitable habitat. In USFS Region 2 there are 41 recorded occurrences, including 36 in Colorado (Rocchio *et al.* 2006). All of the occurrences in Colorado are on the western slope, except for two occurrences at hot springs in the upper Arkansas Valley in Chaffee County and San Luis Valley in Saguache County. This species requires mineral-rich environments with a constant supply of moisture, and it occurs at springs, seeps, and along creeks, nearly always in areas with groundwater discharge in Region 2. It is considered an obligate wetland indicator species.

Occurrence in Study Area

This species was not observed during botanical surveys conducted in 2010 (Attachment D) and suitable habitat is not present. This species has not been recorded in Boulder County.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project will have no effect on this species, for all action alternatives

Impact Summary

All action alternatives will have no impact on stream orchid.

9.1.22 White Adder's Mouth Orchid (*Malaxis brachypoda*)***Status, Distribution and Habitat***

White adder's mouth orchid is a USFS Region 2 sensitive species and is ranked as G4Q/S1 by the CNHP (2013). White adder's mouth occurs across Canada and the northeastern U.S., and in California and Colorado (NRCS 2011). It has been recorded at four sites in Colorado, in El Paso, Boulder, and Jefferson Counties, but efforts to relocate the populations have not been successful (Anderson 2006a). In Boulder County, white adder's mouth has been recorded from Greenman Springs and from Panther Canyon, both of them on sites managed by the City of Boulder Open Space and Mountain Parks. The Greenman Springs population has not been observed since 1990, and the Panther Canyon population not since 1970, despite numerous searches. Habitat is shaded streamsidess and wet mossy

areas, often in areas where mosses are kept wet by spray. Recorded occurrences in Colorado range from 7,200 to 8,100 feet in elevation. This species often occurs with *Listera convallarioides*, which has a more widespread distribution in Colorado, and is a species of local concern for the Arapaho & Roosevelt National Forests.

Occurrence in Study Area

Both this species and *Listera convallarioides* were included as target species in the 2010 botanical species at Gross Reservoir. Neither species was found, and the habitat was considered to be unsuitable.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project will have no effect on this species, for all action alternatives.

Impact Summary

All action alternatives will have no impact on white adder's mouth orchid.

9.2 FRASER VALLEY AND WILLIAMS FORK RIVER SEGMENTS

The only Project-related changes along the river segments are changes in stream flows during operation of the Moffat Collection System. The FEIS provides detailed information on these changes, including modeled changes in average, wet-year and dry-year flows in Appendix H and analysis of change in surface water hydrology in Section 4.6.1. FEIS sections 4.6.2, 4.6.3, and 4.6.4 provide analysis of the effects of the Project on water quality, stream geomorphology, and groundwater. Effects to riparian and wetland habitats are evaluated in FEIS Section 4.6.8. Stream flow changes resulting from operation of the Project are expected to have minor adverse effect to riparian and wetland habitats in the Fraser Valley and negligible effects in the upper Williams Fork River Valley. Flow changes would not noticeably affect availability of suitable habitat for aquatic or riparian species. Stream flow changes would not affect fens, which are primarily supported by groundwater discharge.

Detailed analysis is provided below for 13 species, including 7 animal species and 6 plant species. Of the 7 animal species, the Proposed Action and action alternatives may impact 3 of them, including boreal toad and Colorado River cutthroat trout, and river otter. It would have no impact to northern leopard frog, American bittern, American peregrine falcon, and bald eagle. For the 3 affected species, all of the action alternatives may cause minor short-term impacts to individuals, but are not likely to result in a loss of viability on the USFS planning area nor cause a trend to Federal listing or loss of species viability rangewide.

The Proposed Action and action alternatives would have no impact on any of the 6 plant species, including park milkvetch, dwarf raspberry, silver willow, autumn willow, lesser bladderwort, and lesser panicled sedge.

9.2.1 Boreal Toad (*Anaxyrus boreas boreas* [*Bufo boreas boreas*])***Status, Distribution and Habitat***

Boreal toad is a USFS Region 2 sensitive species, is listed as endangered by the State of Colorado, and is ranked as G4T1Q/S1 by the CNHP (2013). This species ranges from southern Alaska to northern California, western Montana and Wyoming, and the mountains of Utah and Colorado (Keinath and McGee 2005). In Colorado, boreal toads historically occurred in the central mountain ranges and high plateaus from the Wyoming border to the San Juan Mountains, including the Front Range. However, much of the apparently suitable habitat is now unoccupied because of a dramatic declines in population in the past 25 years. Boreal toads primarily occur in wetland habitats at elevations of 7,500 to 12,000 feet, but may occur in other habitats during dispersal to and from breeding habitats, and during the summer.

They have three distinct habitat needs – breeding ponds, summer habitat, and hibernacula. Breeding occurs in a wide variety of water bodies such as beaver ponds, kettle ponds, streams, large reservoirs, and man-made ponds, in areas with shallow pooled or slow-moving water. Egg and tadpole development are temperature dependent, and eggs are deposited in shallow warm water that optimizes the warmth of the sun. Boreal toads have greatly decreased in Colorado in the last 20 years and many former breeding sites have not had activity in recent years (Jackson 2008). During the summer, boreal toads use a wide variety of wet and dry, forested and non-forested habitats. Hibernation occurs in terrestrial habitats, mostly in underground rodent burrows. Adult boreal toads have been observed spending up to 90% of their life in upland terrestrial habitats (Jones *et al.* 2000). Boreal toads may migrate up to about 1.5 miles between breeding ponds and hibernacula. Hibernation occurs in terrestrial habitats, mostly in underground rodent burrows. Longer movements of up to 5 to 6 miles between small populations have been recorded. Boreal toads may migrate up to about 1.5 miles between breeding ponds and hibernacula.

Occurrence in Study Area

Three of seven known breeding sites in Grand County are located on tributaries of the Fraser River, including Jim Creek, upper Vasquez Creek, and Pole Creek (Jackson 2008). No breeding activity has been observed at Jim Creek since 1996 and at Vasquez Creek since 2000, although single toads were observed in the Vasquez Creek area in a couple of years. Monitoring of the Pole Creek site found adults and egg masses every year and recruitment most years since 1993 (Jackson 2008). Surveys for the Fraser Valley Parkway in 2005 did not find any boreal toads in the area between Fraser and Tabernash (CNHP 2005), and surveys for the Fraser River Enhancement Project (Horstman 2004) along portions of the Fraser River and Vasquez Creek did not find this species except for one adult female in atypical habitat. CHNP records show recent occurrences along Pole Creek, its tributary Skunk Creek, and Crooked Creek (CNHP 2005).

There does not appear to be recent documentation of boreal toad presence along the Fraser River and its tributaries below the diversions, but there are relatively large areas of habitat suitable for adult toads and dispersing juveniles (riparian and wetland areas and adjacent uplands), as well as potential breeding habitat (shallow, abandoned, or active beaver ponds and other areas of still, shallow warm water). Recent observations and breeding sites in the

Pole Creek area occur within dispersal distance, and there is enough habitat connectivity to support colonization of the Fraser River (CNHP 2005). Boreal toad recovery activities have occurred along Crooked and Pole creeks since 2000, including creation of toad-specific breeding ponds and overwintering hibernacula. It is possible that toads from the Pole Creek population or other nearby sites will persist, reproduce successfully, and disperse to the Fraser River.

Three known boreal toad sites are located along Williams Fork River (Jackson 2008), including a known breeding site on the upper Williams Fork River downstream of Bobtail, Steelman, and McQueary Creeks, one at McQueary Lake, and an observation of boreal toad at South Fork in 2007. The upper Williams Fork River site is located in an abandoned beaver pond, and small numbers of adults and egg masses have been observed each year through 2007. URS biologists observed tadpoles in this pond in the fall of 2010. Another breeding site is located less than one mile from the affected segment of Williams Fork River at McQueary Lake (Keinath and McGee 2005). Suitable habitat for adults and dispersing young occurs along most of the upper Williams Fork River.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Boreal toads are known to occur along the upper Williams Fork River, and may occur along the Fraser River and its main tributaries including Vasquez Creek.

The Project would not directly or indirectly affect known breeding sites. Boreal toads breed in ponds, most commonly in beaver ponds. The upper Williams Fork boreal toad monitoring site is located very near the Williams Fork River, but is supported by groundwater and surface flow from a side drainage and is located several feet higher in elevation than the Williams Fork River. The Jim Creek and Vasquez Creek sites in the Fraser Valley also appear to be supported by groundwater and have no recent breeding records. The McQueary Lake site in the William Fork Valley and the Pole Creek site in the Fraser Valley are located far upstream on tributaries.

The Project is unlikely to adversely affect availability of summer habitat and hibernacula. Flow changes are expected to have minor or negligible impacts on riparian habitats (DEIS Section 4.8). Boreal toads use a wide variety of habitats during the summer and are not restricted to streamside areas. Large areas of both upland and riparian habitats in the Fraser and Williams Fork River valleys are potential summer habitat, and small changes in streamside riparian habitats are unlikely to adversely affect their population or distribution. The Project would not involve any construction activity in their habitat and would not cause direct effects or transmission of disease.

Impact Summary

All action alternatives may cause minor short-term impacts to individual boreal toads, but are not likely to result in a loss of viability on the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.2.2 Northern Leopard Frog (*Lithobates pipiens* [*Rana pipiens*])

Note: This species is also evaluated in Section 9.1.1 for the Gross Reservoir study area.

Status, Distribution and Habitat

Northern leopard frog is a USFS Region 2 sensitive species and is listed as G5/S3 by the CNHP (2013). The population segment west of the Mississippi River recently was the subject of a 12-month review by the USFWS for being listed as threatened, but listing was determined to be not warranted (USFWS 2011). Northern leopard frogs occur across much of the northern U.S., southern Canada, and south to California, Arizona and Mexico in the west. They have been reported throughout Colorado except for the southeastern and east-central portions of the state at elevations ranging from 3,500 to above 11,000 feet (Hammerson 1999), but are currently considered to be uncommon and declining in Colorado (Smith and Keinath 2009). Northern leopard frogs breed in a variety of habitats that have slow moving or still water, that lack predaceous fish and other predators, and that have emergent vegetation such as sedges and rushes (USFWS 2009). They require deeper stream, pond, or lake habitats that do not freeze to the bottom and that are well-oxygenated for overwintering and adjacent wetlands and upland habitats for feeding. These frogs are usually found along the water's edge but they may roam long distances especially during wet weather. Northern leopard frogs are active on the Colorado plains from March to October or November. The breeding season is in April and May at lower elevations and May and June at higher elevations.

Occurrence in Study Area

The Colorado Herpetological Atlas (CPW 2011) does not show any records of northern leopard frog. The distribution provided in Hammerson (1999) shows one record that appears to be near or along the Fraser River. Northern leopard frogs have been reported in Colorado at elevations above 11,000 feet, although most populations are at lower elevations. No northern leopard frogs were found during Project field work. Based on this information, northern leopard frogs may occur along the Fraser and Williams Fork Rivers, but are not common.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Northern leopard frog is more likely to occur in ponds and wetlands than in the rivers themselves. Predatory fish in the rivers are likely to strongly limit use of this habitat. Flow changes in the rivers would affect relatively narrow areas along the river banks and are not expected to affect availability of pond habitat.

Impact Summary

All action alternatives would have no effect on northern leopard frog along the Fraser and Williams Fork Rivers.

9.2.3 American Bittern (*Botaurus lentiginosus*)***Status, Distribution and Habitat***

American bittern is a USFS Region 2 sensitive species and is not included on the CNHP 2013 tracking lists. American bitterns breed throughout southern and central Canada, the northern U.S., and south into central California and New Mexico. They winter in the southern U.S., chiefly in marshes along the Gulf of Mexico coastal plain, and in Central

America and portions of the Caribbean. American bittern breeding populations are currently disjunct and uncommon in Colorado, and appear to be less common than historic records, and appear to be declining across North America. American bitterns nest in relatively large emergent cattail and bulrush wetlands. They forage primarily in wetlands but may forage in adjacent uplands. American bittern are very secretive.

Occurrence in Study Area

Andrews and Righter (1992) indicated that American bittern were a rare to uncommon summer resident in mountain parks, including central Grand County. Neither the first nor the second Colorado Breeding Bird Atlas (Kingery 1998; Colorado Breeding Bird Atlas II 2011) documented breeding by American bittern in Grand County. There do not appear to be any large cattail marshes associated with the Fraser River and its tributaries, and breeding appears highly unlikely. During migration, American bittern could be found in riparian and wetland habitats along larger rivers, but regular occurrence is unlikely. Suitable habitat for this species (large cattail marshes) does not appear to be present on USFS lands in the Fraser and upper Williams Fork River valleys.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

American bittern are unlikely to breed or occur regularly in the Fraser Valley, and are unlikely to occur in the Upper Williams Fork River valley. Changes in flows resulting from increased diversions by Denver Water may be unlikely to affect the distribution or occurrence of this species or of marsh habitat, which is typically associated with impoundments or areas of high groundwater. Changes in flows to smaller tributaries would have no effect to American bittern because suitable habitat is not present.

Impact Summary

All action alternatives would have no effect on American bittern.

9.2.4 American Peregrine Falcon (*Falco peregrinus anatum*)

Note: This species is also evaluated in Section 9.1.5 for the Gross Reservoir study area.

Status, Distribution and Habitat

Peregrine falcons were formerly listed as threatened, and are currently a USFS Region 2 sensitive species and are ranked as G4T4/S2B by CNHP (2013). Peregrine falcons have a world-wide range, except Antarctica. They breed from Alaska south into the Rocky Mountains, including western Colorado. They nest on high cliffs overlooking open country or water. Their nest is a scrape of loose soil or sand. After a drop in population from eggshell thinning, recovery efforts resulted in Colorado populations growing from 8 known in 1982 to 115 in 2001 (Craig and Enderson 2004). They feed on rodents and small to medium-sized birds. Most of the breeding peregrine falcons migrate south for the winter; migrating and wintering birds forage mostly over reservoirs, rivers and marshes.

Occurrence in Study Area

Peregrine falcon may occur along the Fraser or upper Williams Fork Rivers during migration or foraging. No specific information has been found documenting nesting along these rivers.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Flow changes are expected to cause only minor or negligible changes in riparian habitats along the Fraser and upper Williams Fork Rivers, and are unlikely to change the availability of prey or foraging conditions

Impact Summary

All action alternatives would have no impact to peregrine falcon along the Fraser and Upper Williams Fork Rivers.

9.2.5 Bald Eagle (*Haliaeetus leucocephalus*)

Note: This species is also evaluated in Section 9.1.6 for the Gross Reservoir study area.

Status, Distribution and Habitat

Bald eagle was a threatened species under the ESA until 2007. It is ranked as G5/S1B,S3N by CNHP (2013). Currently, bald eagles are protected under both the Bald and Golden Eagle Protection Act and as a USFS Region 2 sensitive species. In Colorado, breeding and wintering populations occur mostly along major riparian corridors and near large bodies of water; although they may occur in upland areas where they feed on species such as prairie dogs and deer and elk carcasses. Bald eagles build large nests in trees and often use the same nest year after year. Nests and roosts are usually located in tall trees near water in areas free of human activity and development. In Colorado, nest trees are located in various forest types from old growth ponderosa pine to linear groups of riparian woodland (Kingery 1998). Bald eagles pair for life and typically return to the same breeding territory year after year. Nests are usually located within 2.5 miles of large lakes, reservoirs, major rivers or estuaries where there are adequate prey, perching sites, and nesting sites.

Wintering populations of bald eagle are highest from November through early March in Colorado. In winter, bald eagles often congregate at roost sites that are used for sleeping and for protection from winter storms and they may forage at open water, in upland areas, and on frozen lakes for fish frozen into the ice.

Occurrence in Study Area

The lower 4 miles of the Fraser River is winter foraging habitat for bald eagles (NDIS 2011). The lower 9 miles of the Williams Fork River, below the focus segment, contains winter range and foraging habitat and about 2 miles of winter concentration area. The lower 5 miles is also summer foraging habitat, and nest sites are located near the confluence of the Colorado River and Williams Fork. Summer foraging habitat is areas where bald eagles are common from March 15 to July 30. No bald eagle habitats are located along the upper portions of the Williams Fork River.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Flow changes are expected to cause only minor or negligible changes in riparian habitats along the Fraser River and upper Williams Fork Rivers, and are unlikely to change the availability of prey or foraging conditions.

Impact Summary

All action alternatives would have no impact to bald eagle along the Fraser and Upper Williams Fork Rivers.

9.2.6 Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*)***Status, Distribution and Habitat***

Colorado River cutthroat trout is a USFS Region 2 Sensitive species, is a species of special concern for the State of Colorado, and is ranked as G4T3/S3 (CNHP 2013). Colorado River cutthroat trout was petitioned for listing as threatened, but a 12-month finding by the USFWS in 2007 determined that listing was not warranted at that time (USFWS 2007). It was once distributed throughout the colder waters of the Colorado River Basin above the Grand Canyon, but currently only about 8 percent of its historical range has unhybridized or ecologically significant populations (Young 2008). They currently occupy relatively steep coldwater streams, rivers and lakes in Colorado, Utah and Wyoming, throughout its original range. Most current populations are limited to relatively small and unproductive headwater streams and are isolated from other populations. Larger, more productive low-elevation streams are now occupied by nonnative trout species. Remaining populations are at risk from invasion by nonnative trout species, loss of genetic variation and catastrophic environmental changes (Young 2008).

Recent genetic studies on the relationship between the Colorado River and greenback cutthroat trout have identified two divergent lineages within the ranges of these two fish, which correspond to the two described subspecies. However, sampling and analysis has found that many assumed greenback or Colorado River cutthroat populations belong to the other lineage. It is not known if this distribution is natural, the result of moving fish across river drainages, or the result of a close genetic relationship between the two subspecies and insufficient time to evolve separate physical characteristics. The Greenback Recovery Group is conducting ongoing research to help resolve this issue. The presence of greenback cutthroat trout on the West Slope (Fraser and Williams Fork River valleys) was not addressed in the 2009 BA and BO; a Supplemental BA will be prepared to address Project impacts in these areas.

Occurrence in Study Area

Populations of cutthroat trout are present in several of the Fraser River tributaries above the Denver Water diversions. The range-wide status review for Colorado River cutthroat trout (Hirsch et al. 2006) classified populations as “core conservation populations” or “conservation populations” depending on genetic purity. Populations in Iron Creek (tributary to St. Louis Creek), Hamilton (tributary to Ranch Creek), Jim, Ranch (Middle, North and South Forks), and Little Vasquez creeks were known or considered to be

genetically pure (i.e., core conservation populations), while populations in Vasquez and Cabin creeks, and the Fraser River were identified as hybridized with either rainbow trout or other cutthroat trout subspecies (i.e., conservation populations). The population in Little Vasquez Creek has subsequently been identified as greenback lineage, which may result in it being reclassified as greenback cutthroat trout.

Cutthroat trout have also been reported to be present above Denver Water's diversion on St. Louis Creek, and downstream of the diversions on Fraser River, Vasquez Creek, Little Vasquez Creek, North Fork Ranch, South Fork Ranch, and Cabin Creek.

Populations of cutthroat trout are present in three of the Williams Fork tributaries above the Denver Water diversions, McQueary Creek, Steelman Creek, and Bobtail Creek. Hirsch *et al.* (2006) identified the population in Bobtail Creek as a genetically pure (i.e., a Colorado River cutthroat trout core conservation population), while the population in Steelman Creek was considered to be 90 to 99% unaltered (Colorado River cutthroat trout conservation population). Both of these have subsequently been found to be greenback lineage, which may result in them being reclassified as greenback cutthroat trout. The population in McQueary Creek was considered to be hybridized. Cutthroat trout have also been reported downstream of the diversions on Bobtail and Steelman creeks.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

All of the core conservation populations and conservation populations of Colorado River cutthroat trout in the Fraser and Williams Fork tributaries from which water is diverted occur above the diversions. The diversions are mostly considered to be complete or partial barriers and all of the populations are described by Hirsch *et al.* (2006) as isolated with the exception of North, Middle and South Fork Ranch Creek, which are considered weakly connected. Fish that move downstream of the diversions are therefore generally lost to the populations above the diversions. The source populations would not be affected by the flow changes below the diversions. Changes in flows below the diversions have the potential to affect individual fish, but would not affect the conservation populations.

The diversions do not include screens to prevent entrainment, and entrainment may occur. The action alternatives do not include any physical modifications to the diversion structures or operations with the exception of increased water diversions. The diversion structures are therefore not analyzed in the FEIS. The risk of entrainment from operation of the Moffat Collection System is expected to remain the same as under existing conditions.

Impact Summary

Because the Proposed Action would not affect conservation populations, all action alternatives may cause minor short-term impacts to individual Colorado River cutthroat trout, but are not likely to result in a loss of viability on the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.2.7 River Otter (*Lontra canadensis*)***Status, Distribution and Habitat***

River otter is a USFS Region 2 sensitive species and a Colorado state threatened species but is not currently included on the CNHP list of tracked species (CNHP 2013). Its global rank is G5 and it occurs in all the mainland U.S. states. River otters inhabit high-quality, perennial rivers that support abundant fish or crustaceans within many habitats ranging from semi-desert shrublands to montane and subalpine forests. Minimum estimated water flows are 10 cubic feet per second. Other habitat features that may be important include the presence of ice-free reaches of stream in winter, water depth, stream width, and suitable access to shoreline (Fitzgerald *et al.* 1994).

Occurrence in Study Area

River otters' overall range includes the entire length of the Fraser River below Denver Water's diversion, and winter range occurs downstream of Granby (NDIS 2011). The Fraser River tributaries that are diverted by Denver Water are not mapped by NDIS as being within the overall range of river otter. The lower Williams Fork River includes areas occupied by river otter (NDIS 2011). According to Colorado Department of Natural Resources (2010), river otter occur upstream to Kinney Creek and numerous road kill otter are collected along CR3. The focus segment above South Fork does not appear to be occupied by river otter. CPW conducts annual river otter surveys along the Fraser River, Williams Fork, Colorado River, and Blue River.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

River otters occur along the Fraser, Colorado, and Blue Rivers, but the tributaries of the Fraser River and the upper Williams Fork River are not part of their overall range (NDIS 2011). Flow changes would have minor or negligible impacts on riparian habitats along these rivers (FEIS Section 5.8), negligible to beneficial impacts to fish in the Fraser River, and no effect to the fish community in the Colorado and Blue Rivers (Section 5.11). Changes in water levels would not affect access to dens in winter because flow changes would be relatively small, 0 to -6% from November to March in the upper and middle Fraser Rivers, (FEIS Tables H.3-2, 6, 11, 17) and -2 to +2% in these months in the lower Fraser, Colorado and Blue Rivers (FEIS Tables H.3.22, 23, 31, 32, 33, 36). In addition, river otters choose dens opportunistically and often use beaver bank dens, dams and lodges, and are highly mobile (Boyle 2006). Based on these considerations, impacts would be negligible and would not affect distribution or abundance of river otter.

Impact Summary

All action alternatives may cause minor short-term impacts to individual river otter, but are not likely to result in a loss of viability on the USFS planning area, nor cause a trend to Federal listing or a loss of species viability range wide.

9.2.8 Park Milkvetch (*Astragalus leptaleus*)

Note: This species is also evaluated in Section 9.1.11 for the Gross Reservoir study area.

Status, Distribution and Habitat

Park milkvetch is a USFS Region 2 sensitive species and is ranked as G4/S2 by the CNHP (2013). Its total range extends from Montana and Idaho to central Colorado, but occurrences are scattered and generally isolated (Ladyman 2006a). It appears to be most abundant in Idaho. In Colorado, it has been found in Jackson, Chaffee, Larimer, Summit, Park, Gunnison, and possibly Eagle counties. It occurs in sedge-grass meadows and among streamside willows in the montane zone. It appears to occupy edges of wet meadows and moist areas between saturated soils and drier uplands, and is considered an obligate wetland species. Recorded occurrences in Colorado are mostly from large mountain valleys, including North Park, Middle Park, South Park, Gunnison Basin, and San Luis Valley. It occurs from about 7,500 to 10,000 feet elevation, over Quaternary alluvium and older gravels (Spackman *et al.* 1997).

Occurrence in Study Area

This species is not known to occur in Grand County, according to the records summarized in Ladyman (2006a). The USFS lands along the Fraser and Williams For valleys below the diversions have a different ecological setting than the locations where this species has been found, and it is unlikely to occur.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on park milkvetch, because suitable habitat is not present.

Impact Summary

All action alternatives would have no impact on park milkvetch.

9.2.9 Dwarf Raspberry (*Rubus arcticus* var. *acaulis*)

Note: This species is also evaluated in Section 9.1.13 for the Gross Reservoir study area.

Status, Distribution and Habitat

Dwarf raspberry is a USFS Region 2 sensitive species and is ranked as G5T5/S1 by the CNHP (2013). Dwarf raspberry is a small herbaceous raspberry that is perennial and rhizomatous and reproduces both vegetatively and by seed. It occurs in widely disjunct sites in North America and possibly Kamchatka (Ladyman 2006b). In North America, it has been found from Alaska through much of Canada to Washington, Colorado and Wyoming, Minnesota, Michigan and Maine. There are 10 documented sites in Colorado and Wyoming, including three sites on Arapaho National Forest lands in Grand County. In addition to the five sites in Colorado in Grand and Park Counties documented by Ladyman (2006b), the PLANTS database (NRCS 2011) reports that it has been recorded in Clear Creek County. An additional site near the Gross Reservoir study area was recorded by Rick Brune (Shapins Associates 2002). Dwarf raspberry occurrences in USFS Region 2 are in the montane and sub-alpine zones at elevations of 7,000 to 9,700 feet. Vegetation types include *Salix planifolia*/*Carex (rostrata) utriculata* (plainleaf willow/beaked sedge), and *Picea engelmannii*/*Linnaea borealis* (Engelmann spruce/twinberry). Many of the recorded

sites are fens, but the species does not appear to be restricted to fens. Dwarf raspberry is designated as an obligate wetland plant in Region 8.

Occurrence in Study Area

This species has been reported from several locations in Grand County, but apparently not in areas along the Fraser River and its tributaries or the upper Williams Fork River. Suitable habitat is present and dwarf raspberry may occur.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on dwarf raspberry, if it is present. The primary source of hydrology for fens is groundwater, and the Proposed Action and action alternatives would have no or negligible effect to fens in the river valleys. Changes in flows would also have no effects on populations of this species in upland spruce forest, if they are present.

Impact Summary

All action alternatives would have no impact on dwarf raspberry.

9.2.10 Silver Willow (*Salix candida*)

Status, Distribution and Habitat

Silver willow is a USFS Region 2 sensitive species and is ranked as G5/S2 in CNHP (2013). This species occurs across the northern tier the lower 48 states and in Canada and Alaska. In USFS Region 2, it occurs in Colorado, Wyoming, and South Dakota. According to (Decker 2006a) there are 15 known occurrences in Colorado. Most of the Colorado are in Park County, but populations also occur in Larimer County (Boston Peak fen), and Lake County. NRCS (2011) also identifies occurrence in Clear Creek County and Huerfano County. Throughout its range, silver willow occurs on permanently saturated soils where peat is present. All of the Colorado occurrences are characterized as calcareous, rich fens, or very rich fens, with a neutral to alkaline pH. Within the fens, it is mostly commonly reported on low hummocks or in fen meadows. Elevations range of Colorado occurrences range from 8,800 to 10,600 feet (Spackman *et al.* 1997). The most important threat to this species is hydrologic modification of its habitat.

Occurrence in Study Area

Silver willow is not known to occur in Grand County and is therefore unlikely to be present along the Fraser and upper Williams Fork Rivers. Fens occur along portions of these rivers but it is not known whether they have suitable chemistry to support this species.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on silver willow, if it is present. The primary source of hydrology for fens is groundwater, and the Proposed Action and action alternatives would have no or negligible effect to fens in the river valleys.

Impact Summary

All action alternatives would have no impact on silver willow.

9.2.11 Autumn Willow (*Salix serissima*)***Status, Distribution and Habitat***

Silver willow is a USFS Region 2 sensitive species and is ranked as G4/S1 in CNHP (2013). It occurs primarily in Canada and the northeastern U.S. (Decker 2006b). In USFS Region 2, it occurs in Colorado, Wyoming, and South Dakota. According to (Decker 2006b) there are 9 known occurrences in Colorado, in Larimer Boulder, Park, Routt, La Plata and Custer Counties. Throughout its range, autumn willow is typically associated with areas of permanently saturated soils where peat is present. In Region 2, these areas frequently have a high mineral content and an alkaline pH and are classified as calcareous or rich fens. In other parts of its range, it is primarily associated with saturated peat and is not limited to rich fens. Occurrences in Colorado range from about 7,800 to 9,700 feet in elevation. The foremost threat to this species is hydrologic alterations of its peatland habitat.

Occurrence in Study Area

Autumn willow is not known to occur in Grand County. Fens occur along portions of these rivers but it is not known whether they have suitable chemistry to support this species. This species could be present along the river segments in the Fraser and Williams Fork River valleys.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on autumn willow, if it is present. The primary source of hydrology for fens is groundwater, and the Proposed Action and action alternatives would have no or negligible effect to fens in the river valleys.

Impact Summary

All action alternatives would have no impact on autumn willow.

9.2.12 Lesser Bladderwort (*Utricularia minor*)***Status, Distribution and Habitat***

Lesser bladderwort is a USFS Region 2 sensitive species and is ranked as G5/S2 CNHP (2013). It is a circumboreal species that occurs in Alaska, Canada and the northern and western states of the continental U.S. (NRCS 2011). In USFS Region 2, it occurs in Colorado, Wyoming, South Dakota, and Nebraska. According to Neid (2006) there are 11 known occurrences in Colorado. Populations have been observed in several Colorado counties, including Larimer, Boulder, Park, and Jackson. Lesser bladderwort is an aquatic species that grows in shallow water up to 1 foot in depth, in a variety of settings including lakes, beaver ponds, wet swales, and ruts. In Colorado, lesser bladderwort occurs in both poor and extremely rich fens, and in enriched seeps and beaver ponds, in shallow water and

in wet hollows between hummocks. Areas where it occurs have either low nutrient status or low oxygen levels. Occurrences in Colorado range from about 8,200 to 10,200 feet in elevation. The foremost threat to this species is hydrologic alterations of its habitat.

Occurrence in Study Area

Lesser bladderwort is not known to occur in Grand County. It could potentially occur in ponds or fens along the Fraser or Williams Fork Rivers.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on lesser bladderwort, if it is present. The primary source of hydrology for fens and ponds is groundwater. The Proposed Action and action alternatives would have no or negligible effect to fens and ponds along the Fraser River and its tributaries and the upper Williams Fork.

Impact Summary

All action alternatives would have no impact on lesser bladderwort.

9.2.13 Lesser Panicked Sedge (*Carex diandra*)***Status, Distribution and Habitat***

Lesser panicked sedge is a USFS Region 2 sensitive species and is listed as G5/S1 by CNHP 2013. It occurs in most of the northern and states in the U.S., including Colorado, Wyoming and Nebraska in USFS Region 2. There are about 13 reported occurrences in Colorado, in Larimer, Boulder, Grand, Jackson, Saguache, and Garfield counties (Gage and Cooper 2006a). In Colorado it occurs in montane to subalpine fens, primarily on either anchored or floating peat mats. Lesser panicked sedge is generally found in very wet microsites, such as adjacent to open water along the margins of ponds or floating peat mats. Generally, when present in a fen, it occupies the wettest non-aquatic microsites, which may include pools, hollows, or floating mats. This species has been reported from sites exhibiting a wide range of pH values. Elevations of known sites in Colorado range 7,650 to 9,600 feet.

Occurrence in Study Area

Lesser panicked sedge is not known to occur in Grand County, but suitable habitat is present. This species may occur in fens in the valleys of the Fraser and Williams Rivers.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on lesser panicked sedge, if it is present. The primary source of hydrology for fens is groundwater. The Proposed Action and action alternatives would have no or negligible effect to fens along the Fraser River and its tributaries and the upper Williams Fork.

Impact Summary

All action alternatives would have no impact on lesser panicked sedge.

MIS for the ARNF are provided in Table 10-1, along with an assessment of their potential to occur in the Gross Reservoir study area and Fraser and upper Williams Fork River valleys.

Table 10-1
Management Indicator Species for Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Management Indicator Community	Gross Reservoir		Fraser and Williams Fork River Segments	
			Potentially Affected?	Comment	Potentially Affected?	Comment
Amphibians						
Boreal toad	<i>Anaxyrus boreas boreas</i> (<i>Bufo boreas boreas</i>)	Montane riparian and wetlands	No	No suitable habitat	Yes	Evaluated in EIS
Birds						
Hairy woodpecker	<i>Picoides villosus</i>	Young to mature forest	Yes		No	Not dependent on riparian or wetland habitat
Golden-crowned kinglet	<i>Regulus satrapa</i>	Interior forests	Yes	Gross Reservoir is at lower limit o elevation where breeding occurs	No	Not dependent on riparian or wetland habitat
Mountain bluebird	<i>Sialia currucoides</i>	Openings	Yes		No	Not dependent on riparian or wetland habitat
Pygmy nuthatch	<i>Sitta pygmaea</i>	Old growth	Yes		No	Not dependent on riparian or wetland habitat
Warbling vireo	<i>Vireo gilvus</i>	Aspen forest	Yes	Aspen forest would not be affected	No	Not dependent on riparian or wetland habitat
Wilson’s warbler	<i>Cardellina pusilla</i>	Montane riparian and wetlands	Yes	Elevation too low for breeding, species occurs on migration	Yes	Common in riparian areas

Table 10-1 (cont.)
Management Indicator Species for Arapaho & Roosevelt National Forests

Common Name	Scientific Name	Management Indicator Community	Gross Reservoir		Fraser and Williams Fork River Segments	
			Potentially Affected?	Comment	Potentially Affected?	Comment
Mammals						
Elk	<i>Cervus elaphus</i>	Young to mature forest and openings	Yes	Evaluated in EIS	No	Not dependent on riparian or wetland habitat
Mule deer	<i>Odocoileus hemionus</i>	Young to mature forest and openings	Yes	Evaluated in EIS	No	Not dependent on riparian or wetland habitat
Rocky Mountain bighorn sheep	<i>Ovis canadensis canadensis</i>	Openings	No	No suitable habitat	No	Not dependent on riparian or wetland habitat

10.1 GROSS RESERVOIR

Eight MIS species are known to occur or may occur at Gross Reservoir. Construction and operation of Gross Reservoir would have negligible to moderate impacts to these species, as described below. These species include elk, mule deer, pygmy nuthatch, golden-crowned kinglet, hairy woodpecker, mountain bluebird, warbling vireo and Wilson's warbler. Rocky Mountain bighorn sheep and boreal toad do not occur in the Gross Reservoir study area and would not be affected.

Elk are present in the Gross Reservoir study area during the winter, and three types of crucial seasonal habitats are present: elk migration corridor, severe winter range and winter concentration areas. A summary of impacts to these habitats is presented in Table 10-2. Severe winter range and winter concentration areas are separate categories that overlap in some areas and cannot be added together to derive a total area of elk impact. Elk migration corridors and severe winter range are separate categories but all of the construction and operation impacts would occur in both habitats. Direct loss of elk winter concentration areas and severe winter range would be less than 2% of these habitats in the affected map unit. About 7.0% of the migration corridor would be lost due to the Proposed Action, of which about 1.1% would be temporary impact. Permanent loss of portions of the migration corridor would likely cause changes in elk migration patterns, as described below. Additional information about impacts to elk are provided in the FEIS.

Table 10-2
Direct Impacts to Elk Seasonal Habitats

Type of Habitat/Impact	Acres of Impact to Elk Seasonal Habitats			
	Proposed Action	1c	8a/10a	13a
Elk Severe Winter Range and Migration Corridor				
Permanent	465.1	301.5	363.0	412.7
Temporary	89.3	104.7	97.9	93.4
Total impacts	544.4	406.2	460.9	506.1
Elk Winter Concentration Area				
Permanent	269.0	167.5	203.2	235.5
Temporary	52.1	62.3	58.2	55.2
Total impacts	321.1	229.8	261.4	290.7

Mule deer herds inhabiting the Gross Reservoir study area are not likely to be adversely effected by the reservoir enlargement because no crucial seasonal habitats are present, and the affected area represents a very small part of the habitat available to the data analysis units No. 27 herd. The Project would not affect mule deer winter concentration areas, severe winter range, or migration corridors, but would affect about 544 acres of summer range. Losses of summer range would have a minor effect on the mule deer herd.

Pygmy nuthatch is an indicator for existing and potential old growth and is most often associated with mature ponderosa pine stands (USFS 1997). The Project would affect 1 acre of inventoried old growth and 195 acres of developing old growth, all of which is ponderosa pine or ponderosa pine-Douglas-fir forest, and potential habitat for pygmy nuthatch. The Proposed Action would remove 196 acres of suitable habitat, and would reduce the local population of this species but would have a minor effect to the regional population. Pygmy nuthatch pairs or families occupy year-round territories that vary from 1.3 to 20.1 acres in size (Ghalambor and Dobbs 2006) and averages about 3 acres per breeding pair (USFS 1997). Based on the territory size, the Proposed Action could affect about 65 pairs or families. The estimated number of breeding pairs in Colorado is 51,000 to 399,000 pairs (Kingery 1998). The Proposed Action would affect about one-third of this habitat available within the Gross Reservoir study area.

Golden-crowned kinglet may occur in the Gross Reservoir study area during migration and winter (Andrews and Righter 1992), but is not likely to breed. Nesting occurs primarily in mature, dense spruce-fir forest at elevations above 7,600 feet, while wintering occurs primarily in Douglas-fir and ponderosa pine. This species is considered to be uncommon on the ARNF (USFS 1997). This species is an indicator of interior forest. The Proposed Action would affect only 18 acres of interior forest that could be suitable breeding habitat, which occurs at the lower end of the elevation range where breeding may occur. Because there is a low potential for breeding habitat to be affected, the Proposed Action is expected to have a negligible effect on this species.

Hairy woodpecker is an indicator for young to mature forest, and is known to occur in the Gross Reservoir study area. Home range is about 6 to 9 acres per pair. The Proposed Action would remove about 268 acres of forest on USFS lands. This represents habitat for about 30-43 pairs. This would reduce the local population of this species but would have a

minor effect to the regional population. The estimated population in Colorado is 28,000 to 160,000 breeding pairs (Kingery 1998).

Mountain bluebird is an indicator for forest openings. The Proposed Action would permanently affect about 42 acres of open grasslands and disturbed areas that are potential habitat for mountain bluebirds. Clearing of trees in areas of temporary disturbance may create about 50 acres of new habitat after construction is completed and the areas are revegetated, Mountain bluebirds usually nest in old woodpecker holes or natural cavities in dead trees, and bluebirds would be unlikely to occur unless snags are present either in the cleared area or in the adjacent forest. The Proposed Action would reduce the local population of this species but would have a minor effect to the regional population.

Warbling vireo is an indicator for aspen forests and also nests in cottonwoods and in riparian shrub (Kingery 1998). The Proposed Action would not affect any aspen forest or cottonwoods, but would affect about 5.6 acres of riparian shrub. The area of riparian shrub is equivalent to the breeding territories of 1 to 2 pairs of warbling vireos, according to nesting densities referenced in Kingery (1998). Therefore, the Proposed Action is expected to have a negligible effect on warbling vireo populations.

Wilson's warbler is an indicator for montane riparian and wetland habitat. Nesting occurs from about 8,000 to 12,000 feet elevation, with Wilson's warblers overlapping with yellow warblers from 8,000 to 10,000 feet. The Gross Reservoir study area is below 8,000 feet, and the primary occurrence of Wilson's warblers is likely to be during migration. About 5.6 acres of riparian shrubland would be affected. Based on the limited habitat and the likely absence of breeding, the Proposed Action would likely have negligible effects to Wilson's warbler.

10.2 FRASER VALLEY AND WILLIAMS FORK RIVER SEGMENTS

As indicated in Table 10-1, only two of the MIS species (boreal toad and Wilson's warbler) are dependent on riparian and wetland habitats and may occur along the affected river segments in the Fraser and Williams Fork River valleys.

Boreal toad is also a USFS Region 2 sensitive species and has already been discussed in detail in Section 9.2.1 of this report. Implementation of the Proposed Action or the other action alternatives would have negligible impacts on boreal toad. The Project would not involve any construction activity in their habitat and would not cause direct effects or transmission of disease. Flow changes would have no effect on known breeding sites and are unlikely to adversely affect summer habitat or hibernacula.

Wilson's warbler is an indicator for montane riparian and wetland habitat, and nests from about 8,000 to 12,000 feet elevation in Colorado. They primarily nest in willow or alder thickets along streams, lakes and beaver ponds (Kingery 1998). They are common in suitable habitat along the Fraser River, Williams Fork and their tributaries. As described in FEIS Section 4.6.8, stream flow changes resulting from operation of the Project are expected to have minor or negligible adverse effect to riparian and wetland habitats. Flow changes would not noticeably affect availability of suitable habitat for aquatic or riparian species. Stream flow changes would not affect fens, which are primarily supported by groundwater discharge. The action alternatives would have a negligible effect on Wilson's warbler populations.

In their letter commenting on the Moffat Project DEIS, USFS (2010) provided a list of species of local concern for the ARNF that should be included in surveys and analysis for the Gross Reservoir expansion. The list included 37 named species, plus sphagnum mosses and ferns. In addition, comments on the DEIS identified some ARNF species of local concern that could be present along the Fraser and Williams Fork Rivers.

Botanical surveys were conducted at Gross Reservoir in the summer of 2010, and addressed all of the species of local concern. The survey reports are provided in Appendices C and D. Seven named species were found and are described in detail below. In addition, a number of species of ferns were found. Table 11-1 provides a list of the species that were included in the surveys and an indication of whether the species was observed in this or previous studies. All of the seven species that were found during the surveys would be affected.

For the Fraser and Williams Fork River segments, an assessment was made of the potential for occurrence of the species based on dependence on riparian/wetland habitat and known range. Three of the species of local concern and *Sphagnum* are known to occur in Grand County and are dependent on riparian/wetland habitat, and are addressed in detail. The Proposed Action and action alternatives would have no effects on these species.

11.1 GROSS RESERVOIR

Seven species of local concern were identified in the Gross Reservoir study area, along with a number of species of ferns. As described in Section 7.0, surveys were conducted in the summer of 2010 for these species. Field survey reports are provided in Appendices C and D.

Table 11-2 provides the estimated number of plants of each species that are present within the area of inundation and tree-clearing. Plants within the inundation area would be destroyed by flooding. Plants within area of tree-clearing around the reservoir perimeter could be destroyed or injured by movement of equipment and construction activity, but impacts are avoidable. Most of these species occur in open areas where tree clearing would not be necessary or would be limited. Impacts to plants in the tree-clearing area are avoidable if populations are located and marked in advance of clearing, and vehicles and mechanical equipment are not allowed to operate within the sensitive area.

Table 11-1
Plant Species of Local Concern for Arapaho & Roosevelt National Forests

Common Name	Scientific Name	CHNP Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Comment	Considered in Detail?	Comment
Ferns, all except <i>Cystopteris fragilis</i>	<i>Various</i>	NL (for species found)	Various habitats	Yes	Various species reported by Smith	No	Fern species generally not dependent on aquatic or riparian habitat.
Larimer aletes	<i>Aletes humilis</i>	G2G3/S2S3	Primarily north or west facing slopes in Ponderosa pine/ Douglas-fir communities with decomposed granite derived soils in the crevices and cracks of rock outcrops.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Wild sarsaparilla	<i>Aralia nudicaulis</i>	NL	Cool ravines, foothills and montane. Moist to dry wooded areas.	Yes	Reported by Brune, URS	No	Not dependent on riparian or aquatic habitat.
Paper birch	<i>Betula papyrifera</i>	G5/S1	Cool, north-facing ravines in foothills	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Triangle-leaved moonwort, green-stemmed phase	<i>Botrychium lanceolatum</i> ssp. <i>viride</i>	NL	Mesic deciduous woodlands under closed canopy and mesic coniferous forests.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.

Table 11-1 (cont.)
Plant Species of Local Concern for Arapaho & Roosevelt National Forests

Common Name	Scientific Name	CHNP Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Comment	Considered in Detail?	Comment
Leather leaf grapefern	<i>Botrychium multifidum</i>	G5/S1	Wet meadows, forest edges, lake shores or margins. Typically at elevations between 6,750 to 11,500 feet.	No	Not found in surveys	No	Not reported from Grand County.
Northwestern moonwort	<i>Botrychium pinnatum</i>	G4?/S1	Moist grassy sites in open forests, meadows, near streams, and other sites where soil moisture is constant.	No	Not found in surveys	No	Not reported from Grand County.
“Redbank” moonwort	<i>Botrychium “redbank”</i>	NL	Subalpine open upland areas in Colorado.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Least moonwort	<i>Botrychium simplex</i>	G5/S2	Forest seeps and streamside meadows, mostly subalpine.	No	No suitable habitat	Yes	Reported in Grand County.
Rattlesnake fern	<i>Botrychium virginianus</i>	G5/S1	Cool, moist ravines and canyons in the foothills.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Dewey sedge	<i>Carex deweyana</i>	NL	Moist foothill and montane ravines.	Yes	Reported by Brune, URS	No	Not reported from Grand County.
Woolyfruit sedge	<i>Carex lasiocarpa</i>	G5/S1	Subalpine fens.	No	No suitable habitat	No	Not reported from Grand County.

**Table 11-1 (cont.)
Plant Species of Local Concern for Arapaho & Roosevelt National Forests**

Common Name	Scientific Name	CHNP Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Comment	Considered in Detail?	Comment
Mud sedge	<i>Carex limosa</i>	G5/S2	Fens; montane or subalpine peatlands; often as part of a floating mat community adjacent to an open water system.	No	No suitable habitat	Yes	Reported from Grand County.
Peck's sedge	<i>Carex peckii</i>	G4G5/S1	Cool shaded gulches, Front Range foothills.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Sprengel's sedge	<i>Carex sprengelii</i>	G5?/S2S3	Moist soil in cool ravines in the foothills.	Yes	Reported by CNHP, URS	No	Not reported from Grand County.
Enchantress's nightshade	<i>Circaea alpina</i>	NL	Moist to wet woods and cool ravines.	Yes	Reported by CNHP, URS	No	Not reported from Grand County.
Purple cinquefoil	<i>Comarum palustre</i>	NL	Grows in bogs, marshes, wet meadows, creek banks, and lake margins.	No	Not found in surveys	No	Not reported from Grand County.
Yellow coralroot	<i>Corallorhiza trifida</i>	NL	Montane and subalpine forests; cool, moist habitats.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Spring coralroot	<i>Corallorhiza wisteriana</i>	NL	Semi-shade in montane aspen and pine.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Bunchberry	<i>Cornus canadensis</i>	NL	Subalpine forests.	No	No suitable habitat	No	Not dependent on riparian or aquatic habitat.

Table 11-1 (cont.)
Plant Species of Local Concern for Arapaho & Roosevelt National Forests

Common Name	Scientific Name	CHNP Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Comment	Considered in Detail?	Comment
Hazelnut	<i>Corylus cornuta</i>	NL	Cool ravines in the foothills.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Rattlesnake-plantain	<i>Goodyera repens</i>	G5/S3S4	Shade-loving species found in cool, coniferous forests, usually with a mossy understory. Elevation 8,000 to 9,500 feet.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Tall blue lettuce	<i>Lactuca biennis</i>	NL	Clearings in the foothill canyons.	Yes	Reported by Brune, URS	No	Not dependent on riparian or aquatic habitat.
Rocky Mountain blazing star	<i>Liatris ligulistylis</i>	G5?/S2	Moderate moisture to moist; prairies, meadows, streambanks. Loamy soil.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Wood lily	<i>Lilium philadelphicum</i>	G5/S3S4	Moist woods, thickets, and wet meadows.	No	Not found in surveys	No	Not reported in Grand County.
Northern twayblade	<i>Listera borealis</i>	G4/S2	Moist shady spruce forests, elevations of 8,700 to 10,800 feet.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Broadlipped twayblade	<i>Listera convallarioides</i>	G5/S2	Cool ravines and subalpine forests.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.

**Table 11-1 (cont.)
Plant Species of Local Concern for Arapaho & Roosevelt National Forests**

Common Name	Scientific Name	CHNP Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Comment	Considered in Detail?	Comment
Heartleaved twayblade	<i>Listera cordata</i>	NL	Found in peat-moss hummocks in forests or boggy areas. Also in upland forest humus and or needle duff.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Utah lupine	<i>Lupinus lepidus</i> ssp. <i>utahensis</i>	NL	Gravelly to sandy soils, sagebrush.	No	No suitable habitat	No	Not dependent on riparian or aquatic habitat.
Stiff club-moss	<i>Lycopodium annotinum</i>	NL	Subalpine spruce thickets and willows.	No	No suitable habitat	No	Not dependent on riparian or aquatic habitat.
Fringed loosestrife	<i>Lysimachia ciliata</i>	NL	Wetlands in the Front Range, 5,100-8,000 feet elevation.	No	Not found in surveys	No	Not reported in Grand County.
Leechleaf blazingstar	<i>Mentzelia sinuata</i>	NL	Shale outcrops, Front Range foothills.	No	No suitable habitat	No	Not dependent on riparian or aquatic habitat.
Buckbean	<i>Menyanthes trifoliata</i>	NL	Upper montane and subalpine ponds,	No	No suitable habitat	Yes	Reported from Grand County.
Sweet coltsfoot	<i>Petasites sagittatus</i>	NL	Marshy meadows in intermountain parks and meadows.	No	No suitable habitat	No	Not reported from Grand County.
Slivery primrose	<i>Primula incana</i>	NL	Alkaline clay soil in floodplains and moist open meadows.	No	No suitable habitat	No	No reported from Grand County.

Table 11-1 (cont.)
Plant Species of Local Concern for Arapaho & Roosevelt National Forests

Common Name	Scientific Name	CHNP Status	General Habitat	Gross Reservoir		Fraser and Williams Fork River Segments	
				Considered in Detail?	Comment	Considered in Detail?	Comment
Pictureleaf wintergreen	<i>Pyrola picta</i>	G4G5/S3S4	Cool, moist woods on north or northeast-facing slopes, 6,000-10,000 feet.	No	Not found in surveys	No	Not dependent on riparian or aquatic habitat.
Maryland sanicle	<i>Sanicula marilandica</i>	NL	Along streams in cool canyons in foothills.	Yes	Reported by Brune, URS	No	Not reported from Grand County.
False melic	<i>Schizachne purpurascens</i>	NL	Deeply shaded forested slopes.	Yes	Reported by Brune, URS	No	Not reported from Grand County.
All other Sphagnum species not included as Sensitive	<i>Sphagnum</i> spp.	Various	Subalpine fens.	No	No suitable habitat	Yes	

Note:
 NL = not listed.

Table 11-2
Impacts to Special Status Plant Species at Gross Reservoir

Species	Total Observed Population in 2010	Type of Impact	Estimated Number of Plants Affected			
			Proposed Action	Alternative 1c	Alternatives 8a and 10a	Alternative 13a
Elevation (feet)		Inundation	7,406 ¹	7,357	7,374	7,385
		Tree-clearing	7,410	7,367	7,384	7,395
Wild sarsaparilla <i>Aralia nudicaulis</i>	5,082	Inundation	4,122	3,937	3,992	4,022
		Tree-clearing	20	55	0	100
Dewey sedge <i>Carex deweyana</i>	342	Inundation	156	46	59	81
		Tree-clearing	30	0	7	46
Sprengel's sedge <i>Carex sprengelii</i>	653	Construction	593	37	457	542
		Tree-clearing	31	21	81	66
Enchantress's nightshade <i>Circaea alpina</i>	907	Inundation	706	700	700	700
		Tree-clearing	0	0	0	0
Tall blue lettuce <i>Lactuca biennis</i>	149	Inundation	115	115	115	115
		Tree-clearing	0	0	0	0
Maryland sanicle <i>Sanicula marilandica</i>	32	Inundation	17	0	7	7
		Tree-clearing	0	0	0	0
False melic <i>Schizachne purpurascens</i>	NA	Inundation and Tree-clearing	N/A	N/A	N/A	N/A

Notes:

¹The elevation of 7,406 feet includes the Environmental Pool for mitigation.

N/A = not available

11.1.1 Wild Sarsaparilla (*Aralia nudicaulis*)

Status, Distribution and Habitat

Wild sarsaparilla is an ARNF species of local concern and is not on the CNHP list of tracked species (CNHP 2013). Its global rank is G5 and it occurs throughout much of the northern U.S. and Canada. In Colorado it has been reported from six counties, five of them along the Front Range including Boulder County (NRCS 2011). Its habitat is cool ravines in the foothills and montane zone in eastern Colorado (Weber and Wittman 2001).

Occurrence in Study Area

This species was reported to be present at several locations in 2001 (Shapins Associates 2002), with more than 3,200 plants observed. URS (2011b) found wild sarsaparilla to be a regular component of riparian habitat and shaded mesic areas in the Gross Reservoir study

area. More than 5,000 individuals were observed in 2010, in five populations located in Winiger Gulch, Forsythe Canyon, along the South Platte River, and along two unnamed drainages on the south side of the reservoir.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

All of the action alternatives would inundate about 80 percent of the wild sarsaparilla plants that were found in and near the study area, with the Proposed Action having the greatest effect. The action alternatives would affect all or nearly all of the wild sarsaparilla plants found along South Boulder Creek above the reservoir, and on the two tributaries on the south side of the reservoir. About 440 plants in Forsythe Canyon and 500 plants in Winiger Gulch would not be affected.

There are five to ten other locations of this species on the Arapaho National Forest with less than a thousand individuals (Popovich 2011). The proportion of loss of this species from construction and inundation may affect viability of the local populations, but is not likely to result in a loss of viability Forest-wide. This species is not tracked by CNHP and impacts at Gross Reservoir are not likely to affect overall occurrence in Colorado.

Impact Summary

All of the action alternatives may affect the viability of this species locally in the Gross Reservoir study area, but are not likely to affect forest-wide viability.

11.1.2 Dewey Sedge (*Carex deweyana*)

Status, Distribution and Habitat

Dewey sedge is an ARNF species of local concern and is not on the CNHP list of tracked species (CNHP 2013). Its global rank is G5 (NatureServe Explorer 2010) and it occurs throughout much of the northern U.S. and Canada, and in the Rocky Mountains to New Mexico. It has been found in ten counties in Colorado, on both the east and west slopes (NRCS 2011). In Colorado, its habitat is moist, foothill-montane ravines (Weber and Wittman 2001).

Occurrence in Study Area

Surveys in 2001 (Shapins Associates 2002) found about 50 of this species in Forsythe Canyon and a few plants in one of the drainages on the south side of Gross Reservoir. URS surveys in 2010 confirmed the presence of this species at those locations and additional locations. URS botanists observed 342 individuals in four populations in Forsythe Canyon, Winiger Gulch, and two drainages on the south side of Gross Reservoir.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Under the Proposed Action, inundation would affect nearly half of the Dewey sedge observed; the other action alternatives would affect between about 13 and 24 percent. Additional plants could be damaged by tree clearing. About 140 Dewey sedges were observed that would not be affected by any of the action alternatives, in Forsythe Canyon, Winiger Gulch and one of the southern tributaries. Most of the observed population was in

Winiger Gulch and Forsythe Canyon, where about 65 and 76 plants, respectively, would not be affected by any alternative.

A specimen from the 2001 survey was placed in the University of Colorado herbarium (University of Colorado Museum of Natural History 2011). There are several additional herbarium records of this species from other locations in ARNF, including three at University of Colorado Herbarium (University of Colorado Museum of Natural History 2011), one at Colorado State University herbarium ((Southwest Environmental Information Network (SEINet) 2011) and three at Rocky Mountain Herbarium (SEINet 2011). According to Popovich (2011), the populations in the Gross Reservoir study area are the only confirmed location in the Arapaho & Roosevelt National Forests. The Proposed Action may affect viability of this species locally and Forest-wide, but Alternatives 1c, 8a, 10a, and 13a are not likely to result in loss of Forest-wide viability. This species is not tracked by CNHP and impacts at Gross Reservoir are not likely to affect overall occurrence in Colorado.

Impact Summary

The Proposed Action may affect viability of this species Forest-wide, but Alternatives 1c, 8a, 10a, and 13a are not likely to result in loss of Forest-wide viability.

11.1.3 Sprengel's Sedge (*Carex sprengelii*)

Status, Distribution and Habitat

Sprengel's sedge is an ARNF species of local concern and ranked as G5?/S2S3 on the CNHP list of tracked species (CNHP 2013). It occurs throughout much of the northern U.S. and Canada, and south to New Mexico. It has been found in five counties in Colorado (NRCS 2011). Its habitat in Colorado is along streams in cool ravines in the foothills (Weber and Wittman 2001).

Occurrence in Study Area

CNHP found this species during surveys in 2007, near the junction of Winiger Gulch and its south fork. URS re-located this population and found additional occurrences in other portions of Winiger Gulch and in Forsythe Canyon. An estimated 650 individuals of this species were observed by the Corps. Sprengel's sedge was most common in open areas in the valley bottom. The largest number was found at the confluence of Winiger Gulch and its south fork, at the site where they were originally reported by CNHP.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Proposed Action inundation would destroy about 90% of the observed population. Impacts would be reduced under the other action alternatives. Additional plants could be damaged by tree clearing. All of the 37 plants observed along Forsythe Canyon would be affected under all action alternatives, and 70 to 92 percent of the plants in Winiger Gulch would be affected under Alternatives 1a, 13a, 8a, and 10a. None of the plants in Winiger Gulch would be affected under Alternative 1c. Under Alternative 1a, the only unaffected

subpopulation would be about 50 plants in Winiger Gulch and 10 on the south fork of Winiger Gulch.

There are several herbarium records of this species from other locations in ARNF, including two at University of Colorado Herbarium (University of Colorado Museum of Natural History 2011), and one at Colorado State University herbarium (SEINet2011). According to Popovich (2011), the populations in the Gross Reservoir study area are the only confirmed location on the Arapaho & Roosevelt National Forests. All of the action alternatives except 1c may affect viability of this species locally and Forest-wide. This species is tracked by CNHP and the state rating of S2S3 means it is intermediate between S2 (typically 6 to 20 known occurrences) and S3 (typically 21 to 100 known occurrences). Impacts at Gross Reservoir are not likely to affect overall occurrence in Colorado.

Impact Summary

All of the action alternatives except 1c may affect viability of this species Forest-wide.

11.1.4 Enchantress's Nightshade (*Circaea alpina*)

Status, Distribution and Habitat

Enchantress's nightshade is an ARNF species of local concern and is not listed on the CNHP list of tracked species (CNHP 2013). It occurs in most the western and northern U.S. and in most of Canada, and has been found in five counties in Colorado (NRCS 2011). Its global rank is G5 (Natureserve Explorer 2010) and it occurs throughout much of the U.S. and Canada. Its habitat is cool ravines and spruce-fir forests (Weber and Wittman 2001).

Occurrence in Study Area

More than 900 individuals of this species were observed in Winiger Gulch and one of the tributaries on the south side of the reservoir. This is likely an underestimate because of the diminutive size of the plant. In Gross Reservoir, *C. alpina* occurs on unvegetated, heavily shaded stream banks, growing to the water's edge. Due to the dense shade it prefers, the species was always observed with little or no other associated herbaceous vegetation.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The action alternatives would all have the same or similar impacts. All of the action alternatives would affect one large group of about 500 plants in lower Winiger Gulch and about 200 plants in one of the tributaries on the south side of Gross Reservoir Table 11-2). About 201 plants in the south fork of Winiger Gulch would not be affected by any of the action alternatives.

There are other known populations on the Roosevelt National Forest (Popovich 2011), and all alternatives are not likely to affect Forest-wide viability but may affect viability of the local population. This species is not tracked by CNHP and impacts at Gross Reservoir are not likely to affect overall occurrence in Colorado.

Impact Summary

All alternatives are not likely to affect Forest-wide viability, but may affect viability of the local population.

11.1.5 Tall Blue Lettuce (*Lactuca biennis*)***Status, Distribution and Habitat***

Tall blue lettuce is an ARNF species of local concern and is not listed on the CNHP list of tracked species (CNHP 2013). Its global rank is G5 (NatureServe Explorer 2010). It occurs throughout the northern U.S. and Canada. NatureServe identifies it as non-native to Colorado, but the Plants Database (NRCS 2011) calls it native throughout the lower 48 states. This species has been reported from four counties in northern Colorado (NRCS 2011).

Occurrence in Study Area

One individual of this species was found in Forsythe Canyon in 2001 (Shapins Associates 2002), and was thought to be the only known site on the Roosevelt National Forest (Popovich 2011). URS found about 150 plants of this species at several locations along both Forsythe Canyon and Winiger Gulch. It is a tall herbaceous plant and grows in areas of dense herbaceous vegetation in relatively unshaded areas on mesic terraces.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

One large group of 115 plants would be affected by all action alternatives, and represents about 77% of the individuals that were found. Plants in Forsythe Canyon and further upstream along Winiger Gulch and the south fork of Winiger Gulch would not be affected by any of the action alternatives.

There is only one herbarium record of this species from other locations in ARNF, including a specimen from Larimer County at Rocky Mountain Herbarium (SEINet 2011). According to Popovich (2011), the plants at Gross Reservoir are the only known confirmed locations on ARNF. The proportionate loss of plants may affect viability of this population Forest-wide, as well as locally, for all action alternatives. This species is not tracked by CNHP and impacts at Gross Reservoir are not likely to affect overall occurrence in Colorado.

Impact Summary

All action alternatives may affect viability of this population Forest-wide, as well as locally.

11.1.6 Maryland Sanicle (*Sanicula marilandica*)***Status, Distribution and Habitat***

Maryland sanicle is an ARNF species of local concern and is not listed on the CNHP list of tracked species (CNHP 2013). Its global rank is G5 (NatureServe Explorer 2010). It occurs

throughout much of the northern and eastern U.S. and Canada. This species has been reported from eight counties in Colorado, mostly along the Front Range (NRCS 2012).

Occurrence in Study Area

Several plants of this species were found in 2001 (Shapins Associates 2002) in one of the drainages on the south side of Gross Reservoir. URS (2011b) found a total of about 32 individuals of this species in the same drainage. They occurred in areas of moderate shade along the edges of the creek. All of this population is located on Denver Water or private land, and not on USFS land.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

About half of the Maryland sanicle would be affected under Alternative 1a, and about a quarter for alternatives 8a, 10a, and 13a. Alternative 1c would not affect Maryland sanicle. The population of Maryland sanicle along the drainage south of the reservoir extends outside of the study area onto private land, and there is a good possibility that additional plants occur upstream.

None of the Maryland sanicle plants observed at Gross Reservoir are on USFS land. None of the action alternatives would affect this species on USFS land. The action alternatives may affect the viability of the local population, especially under Alternative 1a. This species is not tracked by the CNHP, and effects to the local population are not likely to affect overall occurrence in Colorado.

Impact Summary

None of the action alternatives would affect the occurrence of this species on USFS land.

11.1.7 False Melic (*Schizachne purpurascens*)***Status, Distribution and Habitat***

False melic is an ARNF species of local concern and is not listed on the CNHP list of tracked species (CNHP 2013). Its global rank is G5 (NatureServe Explorer 2010). It occurs in the northeastern and north-central states, the Rocky Mountains, and Canada, and has been reported from eight counties in Colorado, including Boulder County (NRCS 2011). Its habitat is described as deeply shaded forested slopes (Weber and Wittman 2001).

Occurrence in Study Area

This species was found during surveys of the Gross Reservoir study area in 2001 (Shapins Associates 2002), with about 20-30 individuals at a location in Forsythe Canyon. URS botanists recorded it in three additional locations in 2010, but did not record the number of individuals observed at those locations and did not record some other locations where it was observed. This species appears to be a regular though uncommon constituent of riparian areas, and was also observed in aspen on the north side of Gross reservoir. This species was observed by the Corps in lower Forsythe Canyon, one of the drainages on the south side of Gross Reservoir, and along the north shore of the reservoir.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Two of the locations where this species was recorded by the Corps would be affected by all action alternatives. The third location (in Forsythe Gulch) would be affected by Alternatives except 1c. The location reported by Shapins Associates (2002) would not be affected by any of the action alternatives.

A specimen from the 2001 survey was placed in the University of Colorado herbarium (University of Colorado Museum of Natural History 2011). There are additional herbarium records of this species from other locations in ARNF, including one at University of Colorado Herbarium (University of Colorado Museum of Natural History 2011), and one at Rocky Mountain Herbarium (SEINet 2011). According to Popovich (2011), the plants at Gross Reservoir are the only known confirmed locations on Roosevelt National Forest. All of the action alternatives may affect the viability of this species Forest-wide as well as locally. This species is not tracked by CNHP and impacts at Gross Reservoir are not likely to affect overall occurrence in Colorado.

Impact Summary

All of the action alternatives may affect the viability of this species Forest-wide as well as locally.

11.1.8 Ferns

The ARNF list of species of local concern in USFS 2010 included “FERNS, all species except *Cystopteris fragilis*.” Surveys conducted in 2010 by Scott F. Smith (Attachment D) found 6 species of ferns in the Gross Reservoir study area. All of them are considered to be species of local concern for the ARNF with the exception of brittle bladderfern, which is the most common fern species in Colorado (Weber and Wittman 2001).

- Forked spleenwort (*Asplenium septentrionale*)
- Brittle bladderfern (*Cystopteris fragilis*)
- Male fern (*Dryopteris filix-mas*)
- Rocky Mountain polypody (*Polypodium saximontanum*)
- Western brackenfern (*Pteridium aquilinum*)
- Oregon cliff fern (*Woodsia oregana* spp. *cathcartiana*)

In addition, two other species are expected but were not found, maidenhair spleenwort (*Asplenium trichomanes* ssp. *trichomanes*), and common ladyfern (*Athyrium filix-femina*).

Location information was not recorded for most of these species. The recorded locations of western brackenfern and Rocky Mountain polypody would be inundated under all action alternatives.

These species range from uncommon to very common in Colorado. None are considered rare or vulnerable by the CNHP except forked spleenwort, which is watchlisted, and Rocky Mountain polypody, which is fully tracked by CNHP (2013). Forked spleenwort has a global and state ranking of G4G5/S3S4 and Rocky Mountain polypody has a ranking of

G3?/S3?. Rocky Mountain polypody was found on north-facing cliffs above Forsythe Creek and forked spleenwort was found in small quantities in cracks in rocks and boulders above the north shore trail.

Six species of fern allies were also found, including 3 species of horsetails and 3 species of spikemoss:

- Field horsetail (*Equisetum arvense*)
- Scouringrush horsetail (*Equisetum hyemale*)
- Smooth horsetail (*Equisetum laevigatum*)
- Lesser spikemoss (*Selaginella densa*)
- Bluntleaf spikemoss (*Selaginella mutica*)
- Underwood's spikemoss (*Selaginella underwoodii*)

All of these species are relatively common in Colorado and none of them are tracked by the CNHP.

11.2 FRASER VALLEY AND WILLIAMS FORK RIVER SEGMENTS

This section addresses three species of local concern that may occur along these river segments and that occur in riparian or wetland areas. USFS comments on the DEIS suggested that ferns, several sedge species and three species of twayblade (*Listera* spp.) be addressed as species of local concern for the Fraser River segment. These species were reviewed (Table 11-1) and were only included if they are dependent on riparian/wetland habitat, and could potentially be affected by stream flow changes.

11.2.1 Least Moonwort (*Botrychium simplex*)

Status, Distribution and Habitat

Least moonwort is a plant species of local concern for ARNF and is ranked as G5/S2 by the CNHP (2013). It is a circumboreal species and has been found in most of the northern and western states of the continental U.S., as well as Canada and Alaska. NRCS 2011 shows it as occurring in 5 counties in Colorado, including Grand County, while Anderson (2006b) reports it from 14 counties. Two of the 24 Colorado locations are in Grand County, both within Rocky Mountain National Park. Elevations of Colorado sites range from 8,700 to 12,800 feet. Least moonwort has broad ecological amplitude, and has been found in a variety of habitats including tundra, subalpine meadow, spruce-fir forest, fen, other wetlands and railroad right-of-way. In Colorado, most occurrences are in wetter sites, but it has been found in seasonally dry sites. Threats to least moonwort in USFS Region 2 include ski area development and maintenance, road construction and maintenance, timber harvest, and recreation (Anderson 2006b).

Occurrence in Study Area

Least moonworts have been found in other portions of Grand County, and have the potential to occur along the Fraser and Williams Fork Rivers.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Least moonwort is unlikely to be affected by the action alternatives. The most important threats identified by Anderson (2006b) involve ground disturbance, which would not occur in the Fraser or Williams Fork River study areas. Hydrologic changes, the only impact of the Project in Grand County, are not identified as a concern. In addition, least moonworts have broad ecological amplitude, occurring on sites ranging from open to forested and from dry to wet. Minor changes in riparian habitat caused by changes in stream flows are therefore unlikely to adversely affect this species, if it is present.

Impact Summary

All action alternatives would have no impact on least moonwort.

11.2.2 Mud Sedge (*Carex limosa*)***Status, Distribution and Habitat***

Mud sedge is a plant species of local concern for the ARNF and is ranked as G5/S2 by the CNHP (2013). It is a circumboreal species and occurs throughout most of the northern and western states in the continental U.S., and in Alaska and Canada (NRCS 2011). It has been reported from 10 counties in Colorado, including Grand County (Gage and Cooper 2006b). In Region 2, mud sedge typically occurs in montane or subalpine peatlands, often as part of a floating mat community adjacent to an open water system. Soils are consistently wet throughout the season, with the water table at or near the soil surface. It occurs most commonly in fens formed in small lake basins or depressions, generally at mid to high elevation. Elevations of sites range from 6,600 to 11,600 feet in Colorado and Wyoming.

Occurrence in Study Area

Mud sedge has been found in Grand County in Rocky Mountain National Park and in Routt National Forest, but not in the ARNF. Because it occurs most commonly in Colorado in depressions associated with glacial terrain, it is more likely to occur in headwater areas than along major rivers such as the Fraser River. However, undocumented occurrences could be present in fens along the Fraser River and its tributaries and the upper Williams Fork.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on mud sedge, if it is present. The primary source of hydrology for fens is groundwater, and the Proposed Action and action alternatives would have no or negligible effect to fens along the Fraser River and its tributaries and the upper Williams Fork.

Impact Summary

All action alternatives would have no impact on mud sedge.

11.2.3 Buckbean (*Menyanthes trifoliata*)***Status, Distribution and Habitat***

Buckbean is a plant species of local concern for the ARNF and is not tracked by the CNHP (2013). It occurs in all the northern and western states, throughout Canada, and in Alaska (NRCS 2011). In Colorado, it has been recorded in 11 counties including Grand County. It occurs in upper montane and subalpine ponds, and is an obligate wetland species in region 8.

Occurrence in Study Area

The Colorado State University and University of Colorado herbariums each have one specimen of buckbean from Grand County, both from Rocky Mountain National Park and not from the Fraser or Williams Fork valleys (SEINet 2011; University of Colorado 2011). Suitable habitat is present in fens and ponds along the Fraser and its tributaries, and upper Williams Fork, and the species may occur.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

The Project would have no effect on buckbean, if it is present. The primary source of hydrology for fens is groundwater, and the Proposed Action and action alternatives would have no or negligible effect to fens along the Fraser River and its tributaries and the upper Williams Fork. Except for beaver dams, ponds along these streams are generally upgradient of the streams and appear to be primarily supported by groundwater.

Impact Summary

All action alternatives would have no impact on buckbean.

11.2.4 Sphagnum Species (*Sphagnum* spp.)***Status, Distribution and Habitat***

Eleven species of sphagnum mosses have been recorded in Colorado (Weber and Wittman 2007). Colorado has a relatively limited number of species because its wetlands are generally mineral rich and not acidic, which prevents occurrence of many species. All species grow in fens, shallow aquatic habitats, or wet forest floors. Information on the occurrence of species in Grand County is not readily available. Species that occur widely in Colorado and that may be present include *Sphagnum fimbriatum*, *S. fuscum*, *S. squarrosum*, and *S. warnstorffii*. None of these species are tracked by the CNHP.

Occurrence in Study Area

Several species of sphagnum have the potential to occur in the study area, but no specific information on the occurrence of sphagnum species is available.

Effects of the Proposed Action (Alternative 1a) and Other Action Alternatives

Sphagnum mosses primarily occur in fens or other areas that have prolonged wetness resulting from a high groundwater table, and do not typically occur along streams unless a high water table is present. Changes in stream flows would have negligible or no effect to these habitats.

Impact Summary

All action alternatives would have no impact on sphagnum species.

12.1 PLANT COMMUNITIES OF LOCAL CONCERN

USFS comments on the DEIS (USFS 2010) identified eight plant communities of local concern for the Gross Reservoir study area, and one in the Williams Fork River valley. These are listed in Table 12-1, along with the results of surveys and review of existing information.

Table 12-1
Plant Communities of Local Concern for the ARNF

Common Name	Scientific Name	Gross Reservoir Study Area	Fraser and Williams Fork River Segments
Colorado blue spruce	<i>Picea pungens</i>	Not observed	NA
Ponderosa pine/spike fescue	<i>Pinus ponderosa/Leucopoa kingii</i>	Not observed, may be present	NA
Ponderosa pine/antelope bitterbrush	<i>Pinus ponderosa/Purshia tridentata</i>	Does not occur	NA
Relictual prairie grass-riverine community	<i>Spartina pectinata – Sorghastrum avenaceum- Andropogon gerardii- Dichanthelium oligosanthes- Hypericum majus</i>	Does not occur	NA
Ponderosa pine old growth	<i>Pinus ponderosa</i>	Occurs in survey area. See text.	NA
Upwelling/dome springs/seeps		Does not occur	NA
Thinleaf alder/mesic forb riparian shrubland	<i>Alnus incana/mesic forbs shrubland</i>	Occurs in survey area. See text.	NA
Foothills riparian shrubland	<i>Betula occidentalis/ Maiantheum stellatum or other forbs</i>	Occurs in survey area. See text.	NA
Fens		NA	Occurs in study area. See text.

Note:

NA = not applicable

12.2 GROSS RESERVOIR

Three plant communities of local concern are known to occur in the Gross Reservoir study area, Ponderosa pine old growth, thinleaf alder/mesic forbs shrubland, and foothills riparian shrub. Each of these is discussed below.

Colorado blue spruce was identified as being present in the Gross Reservoir study area in the USFS DEIS comments (USFS 2010), but a blue spruce community not observed during the URS field surveys. According to Popovich (2011) blue spruce communities are known to occur in the general vicinity of Gross Reservoir but the USFS does not have information placing them within the study area.

12.2.1 Ponderosa Pine Old Growth

Information on old growth forest in the Gross Reservoir study area was obtained from the USFS GIS database. Existing old growth occurs only on 21.5 acres, a small portion of the Gross Reservoir study area, along the west edge of the study area near Winiger Gulch and South Boulder Creek. All of the old growth in the Gross Reservoir study area occurs at lower elevation sites dominated by ponderosa pine. Old growth development areas are mature forests that are relatively close to becoming old growth (USFS 1997). Areas designated by ARNF for as old growth development occupy 450 acres above the existing reservoir, about half of the terrestrial habitat on USFS lands, and are located in the southwestern quarter of the study area.

The Proposed Action would affect about 1 acre of low elevation old growth and the other action alternatives would affect less than one acre (Table 12-2). According to USFS (1997), there are approximately 1,300 acres of old growth ponderosa pine on the ARNF. Impacts of Gross Reservoir expansion would cause a loss of about 0.1% of old growth ponderosa pine on the ARNF, a minor impact.

Table 12-2
Impacts to Sensitive Plant Communities at Gross Reservoir

Type of Habitat	Acres of Impact			
	Proposed Action	1c	8a	13a
Existing old growth	1.2	0.2	0.5	0.8
Thinleaf Alder/Mesic Forb Riparian Shrubland and Foothills Riparian Shrubland	4.9	3.8	4.3	4.6

12.2.2 Thinleaf Alder/Mesic Forb Riparian Shrubland and Foothills Riparian Shrubland

CNHP (2004, 2009) identified two ARNF plant communities of local concern in the Gross Reservoir study area. The foothills riparian shrub river birch/mesic forb community was reported to occur along South Boulder Creek above Gross Reservoir, and the thinleaf alder/mesic forb along Winiger Gulch upstream of the reservoir (CNHP 2004, 2009). Shapins Associates (2002) reported that foothills riparian shrub also occurs along much of Forsythe Canyon, and a mix of these communities was observed along two of the drainages along the south side of the reservoir during surveys by the Corps in 2010. The foothills riparian shrub community has a CNHP conservation rating of G4/S2, and the thinleaf alder/mesic forb community has a rating of G3/S3.

The Proposed Action would result in the loss of approximately 5 acres of these communities. Impacts to these communities were estimated based on the results of riparian and wetland surveys conducted for the EIS. Although wetland and riparian surveys used vegetation structure (e.g., tree, shrub, herbaceous) rather than composition, it is likely that all or most of the wetlands identified as scrub-shrub wetlands (PSS) and palustrine emergent wetlands (PEM)/PSS and riparian areas identified as riparian shrubland and riparian wood/shrubland are likely to be these communities. Based on these results, a total of about 4.9 acres of these communities would be affected, in Winiger Gulch, Forsythe Gulch, and South Boulder Creek west of the reservoir, and in the three tributaries on the

south side of the reservoir. Only the occurrences along Winiger Gulch and South Boulder Creek have been identified by CNHP. Direct effects from Gross Reservoir would reduce but would not eliminate these plant communities from these six drainages.

The river birch/mesic forb community has a CNHP conservation rating of G4/S2; the S2 rating means that this community is known typically from 6 to 20 locations in Colorado and/or has few remaining acres. River birch/mesic forb occurs in the Boulder Foothills and Fairview Peak potential conservation areas (PCAs) in Boulder County, in addition to Gross Reservoir, and has been reported in Nevada and Utah in addition to Colorado (CNHP 2009). The thinleaf alder/mesic forb community has a rating of G3/S3, where the S3 rating means that it is known typically from 21 to 100 locations in Colorado. The thinleaf alder/mesic forb community is not listed for other CNHP PCAs in Boulder County (CNHP 2009) but is known from Idaho, Nevada, Utah and Wyoming in addition to Colorado.

In the FEIS, impacts to these two communities are considered as moderate because they would cause a local loss of biodiversity but would not substantially affect their overall distribution or abundance.

12.3 FRASER VALLEY AND WILLIAMS FORK RIVER SEGMENTS

USFS comments on the DEIS requested more information on fens in the Fraser and Williams Fork River valleys. Additional field observations were conducted in 2010 to evaluate presence of wetlands, sources of hydrology, and presence of fens at the sample sites and some other portions of the Fraser River and upper Williams Fork. Observations for presence of fens were made at the sample sites, groundwater sampling sites, diversions and other locations. Soil samples were collected from some potential fen locations to validate field observations and were analyzed for organic matter and clay content at Colorado State University.

Fens are wetlands that primarily have saturated organic soils (peat or muck) and hydrology provided by groundwater. They are considered regionally important because they take thousands of years to develop, are generally not replaceable, and have important hydrological and water quality functions (USFWS 1999). The USFWS goal for mitigation is no net loss of habitat value, meaning that impacts should be avoided. The Corps protects these areas under its Section 404 permitting program, and USFS (ARNF) identifies them as plant communities of local concern. Fens in Colorado typically occur at mid to high elevations where they occupy only a small portion of the landscape. Most fens in Colorado are dominated by sedges, grasses and willows. They are more nutrient rich than bogs (which do not occur in Colorado). Fens contain soils that are classified as histosols, which includes organic soil materials (peat or muck) that are saturated with water for long periods, and that have an organic carbon content of 12 to 18% organic carbon by weight, excluding live roots, depending on the clay content of the soil.

Fens were observed at several of the EIS riparian sample sites, including FR-1, FR-2 and WF-2. Fens were not observed at FR-2.

At FR1, a fen occupies about one-quarter of the sampling site on the west side of the Fraser River. It appears to be supported by groundwater that emerges near the base of a steep slope 150 to 200 feet to the west of the river. The slope was the west edge of the sample site.

The fen includes the mountain willow/beaked sedge community and some adjacent areas mapped as subalpine fir – Engelmann spruce – field horsetail. The fen surface drops gradually to the north and northeast, toward the Fraser River, but no discharge of water was observed where the fen connects with the river north of the sample site. A map of riparian vegetation at FR1 is provided in the FEIS. Saturated soils in the fen occur at elevations of several feet above the current river bank, and would not be affected by changes in stream flow.

Site WF2 has a large fen on the southwest side that had both saturated soils and ponded water in mid-September. The fen generally parallels the river for a thousand feet or more, and is topographically higher than the river at bankfull flow. It appears to be supported by groundwater discharge and at least one tributary stream. No active seepage or drainage into river was observed where it paralleled the river during the September 2010 field visit. Other wetlands in and near the study site were limited to the edge of the river and appear to be supported by surface flows. The small reduction in 2-year flow would not affect the sources of hydrology for the fen.

Fens were observed near the diversions at several locations on the Fraser River tributaries, and are likely to occur at additional sites. Tributaries where they were observed include Jim Creek, Vasquez Creek, and West St. Louis Creek. The fens along Jim Creek and West St. Louis Creek were elevated above the stream and appear to be entirely supported by groundwater discharge. The fen at Vasquez Creek extended across much of the valley bottom except adjacent to the stream channel where mineral soils were present. The portion of the fen away from the river was saturated in September 2010, but the areas nearer the channel were not. This suggests that the primary source of hydrology is groundwater.

Stream flow including seasonal high flows could contribute to alluvial groundwater along the banks but would be peripheral to the fen. Because the primary source of hydrology for fens is regional groundwater, the Proposed Action would have no or negligible effect to fens. Fens are not created or sustained by bank storage.

The following mitigations have been included in the FEIS.

13.1 SENSITIVE RAPTORS AND MIGRATORY BIRD SPECIES AT GROSS RESERVOIR

Northern goshawk and flammulated owl could nest in or near the Gross Reservoir study area, although no nest sites have been identified. In addition, two other migratory birds, American three-toed woodpecker and olive-sided flycatcher have the potential to nest at Gross Reservoir. Possible mitigation measures to avoid or minimize impacts may include:

- If practicable, trees in the construction footprint would be cleared prior to March 1 or after July 31 to prevent raptors (and other birds) from nesting on site and avoid take of or disturbance to active nests during the breeding season. If construction begins after March 1 or prior to July 31, nest surveys would be conducted prior to construction to ensure that no active nests are present in or near the construction footprint. Surveys would be conducted during an appropriate season (generally April 1 through June 1) to determine presence of active raptor nests. Surveys may need to be conducted at multiple times and using different techniques to address all species, including owls.
- If an active nest is located, protective buffer zones would be established around active nests during construction to avoid disturbance while nesting. Buffer zones and seasonal restrictions would be based on CPW (2008) and on consultation with CPW. CPW (2008) recommends a buffer zone of 0.5 mile radius around active northern goshawk nests from March 1 through September 15.

13.2 SPECIAL STATUS PLANTS AT GROSS RESERVOIR

During tree clearing operations, locations of USFS special status plants should be marked in the field prior to clearing operations, with a buffer zone of at least 10 feet. No ground-disturbing activities should occur within the marked populations or buffer zones. Hand cutting of trees may occur.

The USFS (Popovich 2011) recommends the following additional mitigations for impacts to rare plants at Gross Reservoir:

- Wild sarsaparilla. Transplant 200 individuals from affected sites to suitable nearby sites that would not be affected by inundation, or collect and distribute seed from affected sites.
- Dewey sedge. Transplant all affected individuals to suitable nearby sites.
- Sprengel's sedge. Transplant all affected individuals to suitable nearby sites.
- Enchantress's nightshade. Collect and distribute seed to suitable nearby sites. Alternately, surveys may be used to document additional locations that would not be affected.
- Tall blue lettuce. Collect seed from affected plants for two years and spread seed in suitable nearby unaffected habitat.

- Maryland sanicle. Collect seed from affected plants and spread seed in suitable nearby unaffected habitat. Alternately, surveys may be used to document additional individuals that would not be affected upstream of the known location.
- False melic. Collect seed from affected plants and spread seed in suitable nearby unaffected habitat.

All sensitive and local concern plant species. Collect herbarium voucher specimens from affected populations, and provide them to USFS for distribution to herbaria. Ten specimen sheets should be collected for each species, to document their occurrence.

Eight USFS sensitive animal species would be affected by all of the action alternatives Gross Reservoir. These species include northern goshawk, olive-sided flycatcher, American peregrine falcon, bald eagle, flammulated owl, American three-toed woodpecker, Townsend's big-eared bat, and fringed myotis. The Proposed Action and other action alternatives could affect nesting of northern goshawk, olive-sided flycatcher, flammulated owl, and American three-toed woodpecker. Mitigation is described in Section 13 and would include clearing of trees outside of the breeding season. If clearing would occur within the breeding season, nest surveys would be conducted to ensure that no active nests would be affected. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting. Impacts to the other four species may include temporary displacement during foraging, migration, or selection of day roosts (bats). Construction and inundation may cause minor short-term impacts to individuals, but are not likely to result in a loss of viability on the USFS planning area nor cause a trend to Federal listing or loss of species viability rangewide.

The Proposed Action and action alternatives at Gross Reservoir would have no impact on USFS Region 2 sensitive plant species.

Along the diverted streams in the Fraser and Williams Fork River valleys, the Proposed Action and action alternatives may impact three USFS sensitive species, including boreal toad, Colorado River cutthroat trout, and river otter. For the 3 affected species, all of the action alternatives may cause minor short-term impacts to individuals, but are not likely to result in a loss of viability on the USFS planning area nor cause a trend to Federal listing or loss of species viability rangewide.

Construction activities at Gross Reservoir would affect several MIS species, including elk, mule deer, pygmy nuthatch, hairy woodpecker, and mountain bluebird. Construction would have negligible effects on golden-crowned kinglet, warbling vireo and Wilson's warbler. Flow changes in the Fraser and Williams Fork River Valleys would negligible effects on two MIS species, boreal toad and Wilson's warbler.

Construction activities at Gross Reservoir would affect six ARNF plant species of local concern on USFS land, including wild sarsaparilla, Dewey sedge, Sprengel's sedge, enchantress's nightshade, tall blue lettuce and false melic. A seventh USFS species of local concern, Maryland sanicle, would be affected on private land with the Forest. Some of the action alternatives would affect viability on the Forest of Dewey sedge, Sprengel's sedge, tall blue lettuce, and false melic. Activities at Gross Reservoir would also affect six species of fern, one of which is tracked by CNHP and one which is watchlisted. Stream flow changes in the Fraser and Williams Fork River Valleys would not affect any ARNF plant species of local concern.

All of the action alternatives would affect several acres of riparian shrubland at Gross Reservoir that is comprised of two ARNF plant communities of local concern, thinleaf alter/mesic forb riparian shrubland and foothills riparian shrubland. In addition, all of the action alternatives would affect a small area of ponderosa pine old growth. Fens, another ARNF plant community of local concern, are present in portions of the Fraser and Williams Fork River Valleys but are unlikely to be affected by stream flow changes.

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- Anderson, D.G. 2004. *Potentilla rupicola* Osterhout (rock cinquefoil): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/potentillarupicola.pdf>.
- _____. 2006a. *Malaxis brachypoda* (A. Gray) Fernald (white adder's-mouth orchid): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/malaxisbrachypoda.pdf>.
- _____. 2006b. *Botrychium simplex* E. Hitchcock (little grapefern): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/botrychiumsimplex.pdf>. Accessed December 14, 2011].
- Anderson, D.G., and D. Cariveau. 2003. *Botrychium campestre* W.H. Wagner & Farrar (Iowa moonwort): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/botrychiumcampestre.pdf>.
- _____. 2006. *Botrychium campestre* W. H. Wagner and Farrar (Iowa moonwort) Species Conservation Assessment Update.
<http://www.fs.fed.us/r2/projects/scp/assessments/updates/botrychiumcampestre.pdf>. Accessed 2/1/2011. 16 pp.
- Andrews, Robert, and Robert Righter. 1992. Colorado birds: a reference to their Distribution and Habitat. Denver Museum of Natural History.
- Beatty, B.L., W.F. Jennings, and R.C. Rawlinson. 2003. *Botrychium ascendens* W.H. Wagner (trianglelobe moonwort), *B. crenulatum* W.H. Wagner (scalloped moonwort), and *B. lineare* W.H. Wagner (narrowleaf grapefern): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/botrychiums.pdf>.
- Boyle, Steve. 2006. North American River Otter (*Lontra canadensis*): A Technical Conservation Assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/northamericanriverotter.pdf>
- Brune, Richard. 2003. A vegetation survey for threatened, endangered, and sensitive plants along existing and proposed access roads to the Gross Reservoir Dam. FERC Project No. 2035, Amended. Prepared for Denver Water.
- Colorado Breeding Bird Atlas II. 2011. San Juan Institute of Natural and Cultural Resources. Available <http://wwwcobreedingbirdatlasii.org/>
- Colorado Department of Natural Resources. 2010. Letter from James B. Martin, Executive Director, to Scott Franklin, Moffat EIS, Project Manager, U.S. Army Corps of Engineers.

- Colorado Natural Heritage Program (CNHP). 2004. Species Database information. Colorado State University, Fort Collins, Colorado
- _____. 2005. Fraser Valley Parkway Boreal Toad Habitat Inventory: A Report to the Grand County Planning Commission. Prepared by Chris Gaughan and Lee Grunau. August.
- _____. 2009. Survey of Critical Biological Resources in Boulder County, Colorado, 2007-2008. Colorado State University, Fort Collins, Colorado. Prepared for Boulder County Parks and Open Space, Longmont, Colorado. Available at: <http://www.cnhp.colostate.edu/download/reports.aspx>
- _____. 2013. CNHP Conservation Status Handbook (Tracking Lists). Last updated September 2013. Accessed December 12, 2013. <http://www.cnhp.colostate.edu/download/list.asp>
- Colorado Parks and Wildlife (CPW). 2008. Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors.
- _____. 2011. Colorado Herpetological Atlas. Available online at <http://ndis.nrel.colostate.edu/herpatlas/coherpatlas/>. Accessed December 13, 2011.
- Craig, Gerald R., and James H. Enderson. 2004. Peregrine Falcon Biology and Management in Colorado, 1973-2001. Technical Publication No. 43, Colorado Division of Wildlife, Denver.
- Decker, Karin. 2006a. *Salix candida* Flueggé ex Wild. (sageleaf willow): a Technical Conservation Assessment [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/salixcandida.pdf>. Accessed December 14, 2011.
- _____. 2006b. *Salix serissima* (Bailey) Fern. (autumn willow): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/salixserissima.pdf>. Accessed December 14, 2011.
- Elliott, Emily, and Brian Elliott. 2009. Botanical discoveries in Northwestern Wyoming and Adjacent Montana. Castilleja (publication of the Wyoming Native Plant Society) 28(4):3-4.
- Farrar, Donald R., and Steve J. Popovich. 2010. Ophioglossaceae of Colorado, Adjacent States, and Southwest South Dakota. Presented at Native Plant Society of New Mexico Moonwort Workshop, silver City, August 11-12, 2010. <http://www.swcoloradowildflowers.com/PDF/Plant%20Keys/Botrychium%20&%20other%20Ophioglossaceae%20Key.pdf>
- Federal Energy Regulatory Commission (FERC), Office of Energy Projects, and USDA Forest Service, Arapaho Roosevelt National Forest. 1999. Final Environmental Assessment for Hydropower License. Gross Reservoir Hydroelectric Project, FERC No. 2035-006. Colorado
- Fitzgerald, James P., Carron A. Meaney, and David .M. Armstrong. 1994. Mammals of Colorado. University Press of Colorado, Niwot, Colorado.

- Gage, E., and D.J. Cooper. 2006a. *Carex diandra* Schrank (lesser panicled sedge): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/carexdiandra.pdf>. Accessed December 14, 2011.
- _____. 2006b. *Carex limosa* L. (mud sedge): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/carexlimosa.pdf>. Accessed December 14, 2011.
- Ghalambor, Cameron K, and Robert C. Dobbs. 2006. Pygmy nuthatch (*Sitta pygmaea*): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/pygmynuthatch.pdf>
- Gruver, J.C., and D.A. Keinath. 2006. Townsend's Big-eared Bat (*Corynorhinus townsendii*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available:
<http://www.fs.fed.us/r2/projects/scp/assessments/townsendsbigearedbat.pdf>. Accessed June 12, 2011.
- Hammerson, Geoffrey A. 1999. Amphibians and Reptiles in Colorado. Second Edition. University Press of Colorado and Colorado Division of Wildlife.
- Hirsch, C.L., S.E. Albeke, and T.P. Nesler. 2006. Range-Wide Status of Colorado River Cutthroat Trout (*Oncorhynchus clarkia pleuriticus*): 2005. Colorado River Cutthroat Trout Conservation Team Report. Accessed at: <http://www.fws.gov/mountain-prairie/species/fish/crct/>.
- Hornbeck, J. Hope, Deanna J. Reyher, and Carolyn Hull Sieg. 2003. Species Assessment of Great-spurred Violet in the Black Hills of South Dakota. USDA Forest Service, Black Hills National Forest, Custer, SD. Available at:
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm9_012250.pdf
- Horstman, Gregory P. 2004. Fraser River Enhancement Project, Wildlife Analysis. Threatened, Endangered and Sensitive Species Survey, Boreal Toad Recovery, Fisheries Survey. December.
- Jackson, Tina. 2008. Report on the Status and Conservation of the Boreal Toad (*Bufo boreas boreas*) in the Southern Rocky Mountains. 2006-2007. Colorado Division of Wildlife, Denver. Accessed at:
<http://wildlife.state.co.us/Research/Aquatic/BorealToad/Pages/BorealToad.aspx>
- Jones, M.S., S. Brinkman, K. Scherff-Norris, L.J. Livo, and A.M. Goebe. 2000. Boreal toad research in Colorado. Colorado Division of Wildlife, Denver, CO.
- Kennedy, Patricia L. 2003. Northern Goshawk (*Accipiter gentilis atricapillus*): A Technical Conservation Assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. Available at:
<http://www.fs.fed.us/r2/projects/scp/assessments/northerngoshawk.pdf>. Accessed June 12, 2011.

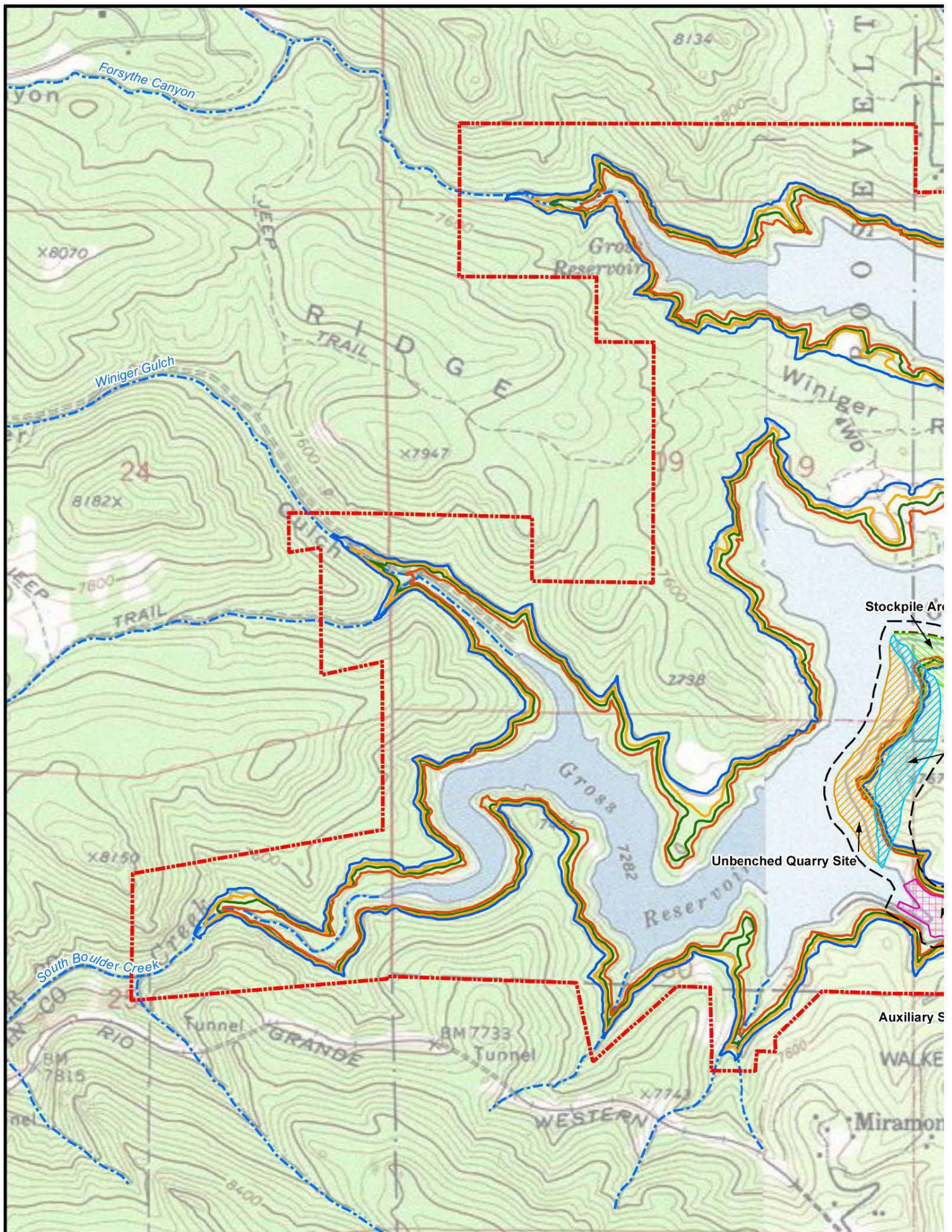
- Keinath, D.A. 2004. Fringed Myotis (*Myotis thysanodes*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/fringedmyotis.pdf>. Accessed June 12, 2011.
- Keinath, D., and M. McGee. 2005. Boreal Toad (*Bufo boreas boreas*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/borealtoad.pdf>.
- Kelso, Tass, and Missa Schurman. 2003. The Puzzling Purples: *Viola serlkirkii*, *Viola adunca* and *Viola soraria* complex in Colorado. *Aquilegia* 27(4):3-4
- Kingery, Hugh (ed). 1998. Colorado Breeding Bird Atlas. Published by the Colorado Bird Atlas Partnership and Colorado Division of Wildlife.
- Kotliar, Natasha B. 2007. Olive-sided Flycatcher (*Contopus cooperi*): A Technical Conservation Assessment. Prepared for the USDA, Rocky Mountain Region, Species Conservation Project.
- Ladyman, J.A.R. 2006a. *Astragalus leptaleus* Gray (park milkvetch): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/astragalusleptaleus.pdf>.
- _____. 2006b. *Rubus arcticus* L. ssp. *acaulis* (Michaux) Focke (dwarf raspberry): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/rubusarcticusspacaulis.pdf>.
- Linkhart, Brian D., Richard T. Reynolds, and Ronald A Ryder. 1998. Home range and habitat of breeding Flammulated Owls in Colorado. *Wilson Bulletin* 110:342-351.
- McCallum, D. Archibald. 1994. Review of Technical Knowledge: Flammulated Owls. pp 14-46 In *Flammulated, Boreal and Great Gray Owls in the United States: A Technical Conservation Assessment*. USDA Forest Service General Technical Report RM-253.
- Mergen, D.E. 2006. *Cypripedium parviflorum* Salisb. (lesser yellow lady's slipper): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/cypripediumparviflorum.pdf>.
- Natural Diversity Information Source (NDIS). 2011. Database and online mapping for Colorado wildlife species. Accessed at: <http://ndis.nrel.colostate.edu> on February 3, 2011.
- Natural Resources Conservation Service (NRCS). 2011. The PLANTS Database (<http://plants.usda.gov>, 13 December 2011). National Plant Data Team, Greensboro, NC 27401-4901 USA.
- Natureserve Explorer. An Online Encyclopedia of Life. 2010. Plant/Animal searches. <http://www.natureserve.org/explorer/>. Last updated August 2010. Date accessed 2/2/2011.

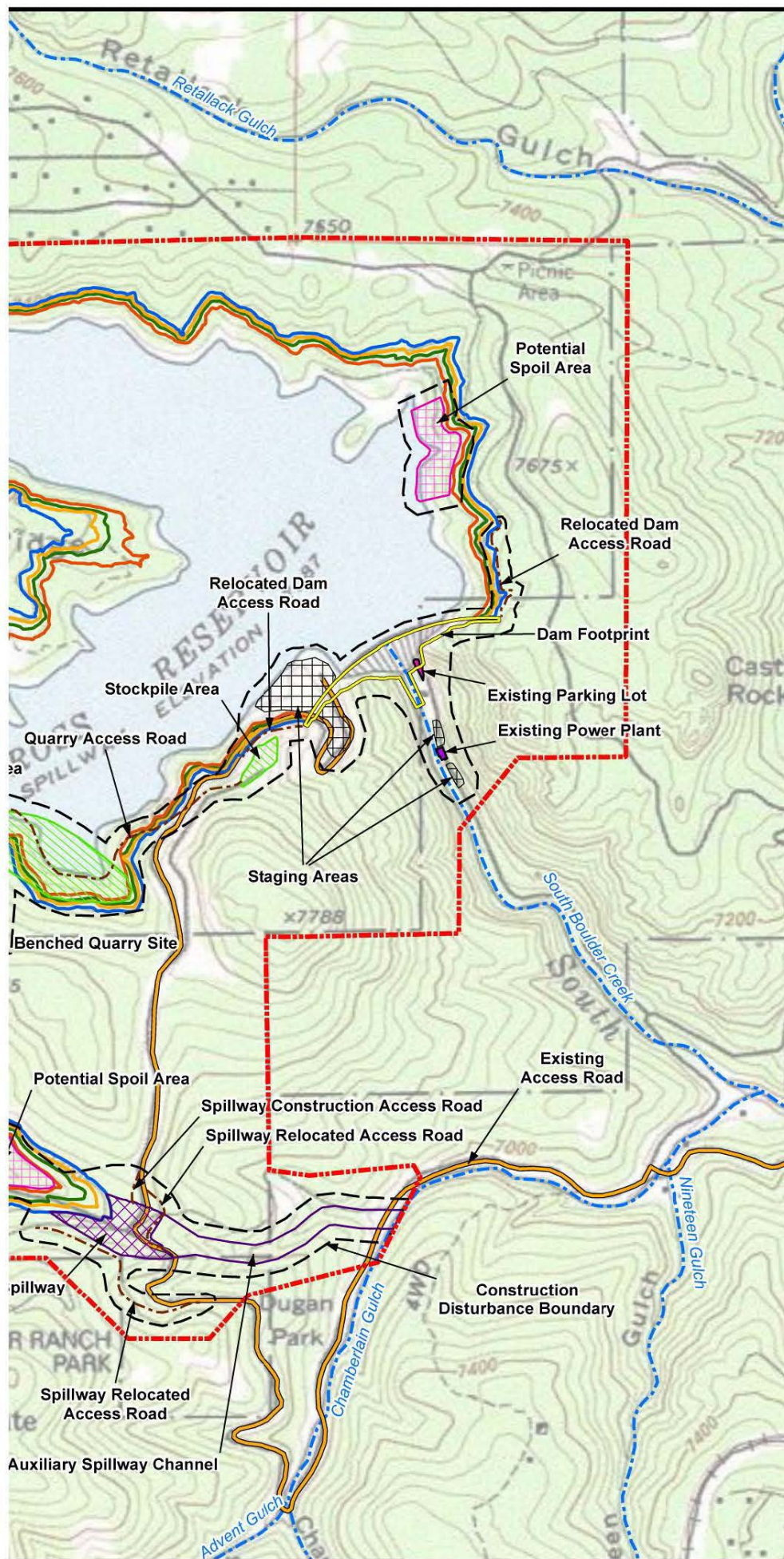
- Neid, S.L. 2006. *Utricularia minor* L. (lesser bladderwort): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/utriculariaminor.pdf>. Accessed December 14, 2011.
- Nelson, Duane, and Tony Leukering. 2007. Atlas II. Manual of Use of Breeding Codes V. 1.0. The Second Colorado Breeding Bird Atlas. August.
- Popovich, Steve J. 2004. *Botrychium lineare* Population Status in Colorado: Clarifications and Suggested Species Assessment Update and Erratum. Report prepared for the Arapaho-Roosevelt National Forests and Pawnee National Grassland, Supervisor's Office, Fort Collins, Colorado. 45pp.
- _____. 2011. Personal communication between Steve Popovich, forest botanist for Arapaho-Roosevelt National Forest and Pawnee National Grassland, and Jeff Dawson, URS Corporation. February 24.
- Rocchio, J., M. March, and D.G. Anderson. 2006. *Epipactis gigantea* Dougl. ex Hook. (stream orchid): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/epipactisgigantea.pdf>.
- Shapins Associates. 2002. Article 410. Plan to Protect Rare and Sensitive Plant Species. In. Gross Reservoir Recreation Management Plan. 2002 draft. Gross Reservoir Hydroelectric Project. FERC Project No. 2035-006.
- Smith, Scott F. 2011. Rare Plant Survey for Gross Reservoir, Arapaho National Forest, Boulder County, Colorado. Prepared for URS. Scott F. Smith Consulting.
- Smith, Hamilton, and Douglas A. Keinath. 2004. Species Assessment for Northern Goshawk (*Accipiter gentilis*) in Wyoming. Prepared for Bureau of Land Management, Wyoming State Office, Cheyenne.
- _____. 2009. Northern Leopard Frog (*Rana pipiens*): A Technical Conservation Assessment. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/northernleopardfrog.pdf> [Accessed 1/31/2011].
- Southwest Environmental Information Network (SEINet). 2011. Search Collections. Available at <http://swbiodiversity.org/seinet/index.php>. Accessed December 20, 2011.
- Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.
- URS Corporation (URS). 2011a. Northern Goshawk and Northern Leopard Frog Survey Results at Gross Reservoir, 2010. Prepared for U.S. Army Corps of Engineers.
- URS. 2011b. Survey for Rare and Sensitive Plant Species at Gross Reservoir, July-August 2010. Prepared for U.S. Army Corps of Engineers.

- U.S. Forest Service (USFS). 1997. Final Environmental Impact Statement to accompany the 1997 Revised Land and Resource Management Plan. Arapaho and Roosevelt National Forests and Pawnee National Grassland.
- _____. 2010. Letter with attachments from Glenn Casamassa, Forest Supervisor, to Scott Franklin, U.S. Army Corps of Engineers (USFS comments on DEIS). March 16. Arapaho and Roosevelt National Forests and Pawnee National Grassland.
- _____. 2011. Forest Service Manual. Rocky Mountain Region (Region 2). Denver CO. Chapter 2670 – Threatened, Endangered and Sensitive Plants and Animals.
- U.S. Fish and Wildlife Service (USFWS). 1999. Regional Policy on the Protection of Fens. As amended. Memorandum from Regional Director, Region 6. Available at: <http://www.fws.gov/mountain-prairie/es/fen/>
- _____. 2007. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the Colorado River Cutthroat Trout as Threatened or Endangered. Federal Register 72(113):23589-23605.
- _____. 2009. 90-Day Finding on a Petition to List the Northern Leopard Frog (*Lithobates [=Rana] pipiens*) in the Western United States as Threatened. Federal Register 74(125): 31389-31401.
- _____. 2011. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Northern Leopard Frog in the Western United States as Threatened. Federal Register 76(193): 61896-61931.
- University of Colorado Museum of Natural History. 2011. Botany Database and Research Tools. Specimen Database of Colorado Vascular Plants. Available at: <http://cumuseum.colorado.edu/Research/Botany/Databases/search.php>. Accessed December 20, 2011.
- Weber, William A., and Ronald C. Wittman. 2001. Colorado Flora: Eastern Slope. University of Colorado Press, Boulder, Colorado.
- _____. 2007. Bryophytes of Colorado. Mosses, Liverworts, and Hornworts. Pilgrim Press, Inc.
- Wiggins, D. 2004. Black Swift (*Cypseloides niger*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/blackswift.pdf> [1/31/2011].
- Young, Michael K. 2008. Colorado River cutthroat trout: a technical conservation assessment. [Online]. Gen. Tech. Rep. RMRS-GTR-207-WWW. Fort Collins, CO: USDA Forest Service, Rocky Mountain Station. 123 p. Available: http://www.fs.fed.us/rm/pubs/rmrs_GTR-207-WWW.pdf [March 2008].

Attachment A
Figures

Figures start on the following page





- Gross Reservoir Study Area
- Alt. 1a Gross Reservoir with Environmental Pool - 77,000 AF Enlargement
- Alt. 13a Gross Reservoir - 60,000 AF Enlargement
- Alt. 8a and 10a Gross Reservoir - 52,000 AF Enlargement
- Alt. 1c Gross Reservoir - 40,700 AF Enlargement
- Dam Footprint
- Construction Disturbance
- Existing Parking Lot
- Existing Power Plant
- Unbenched Quarry Site
- Benched Quarry Site
- Stockpile Area
- Auxiliary Spillway
- Auxiliary Spillway Channel
- Spoil Area
- Staging Area
- Access Road
- Existing Access Road
- Stream/River

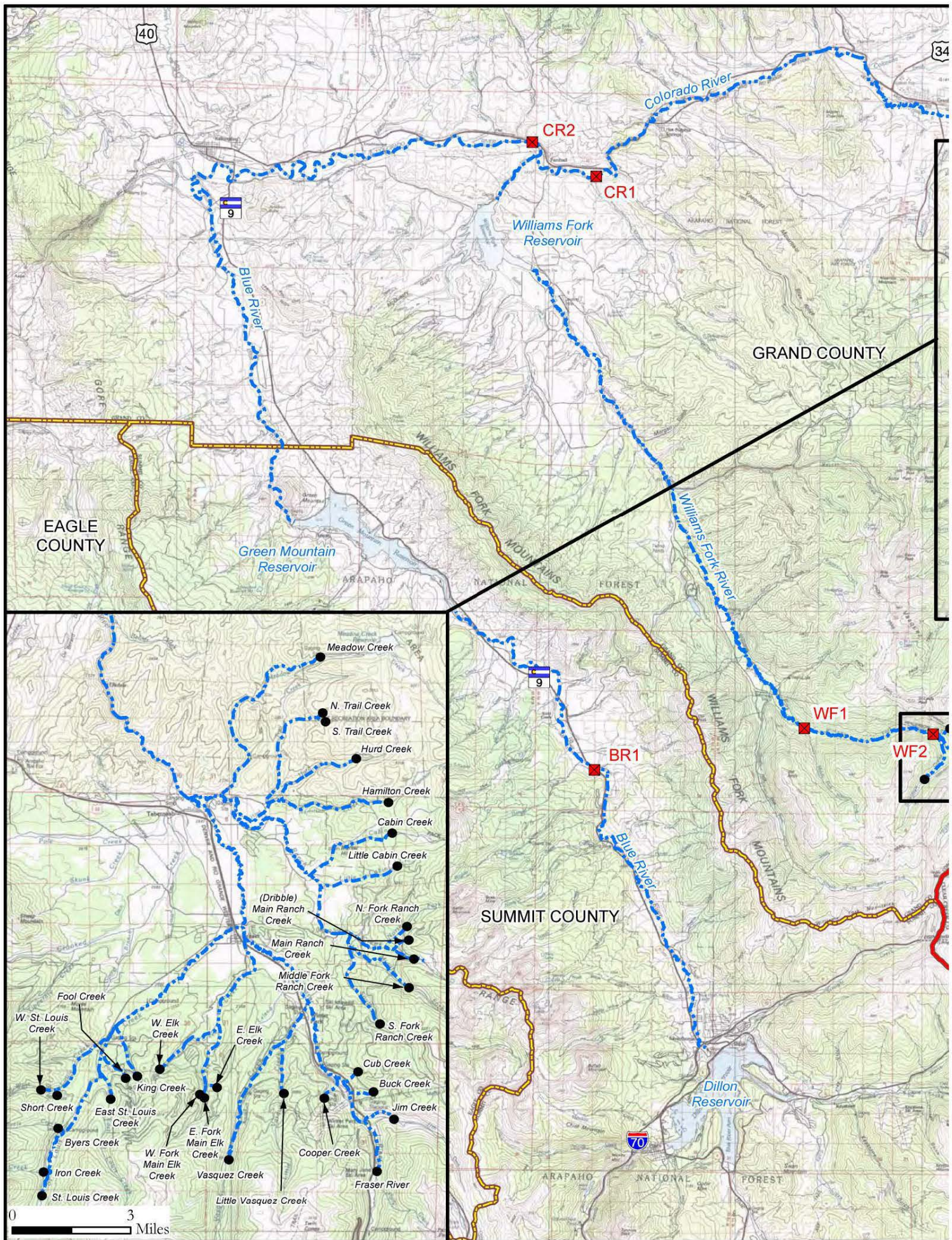
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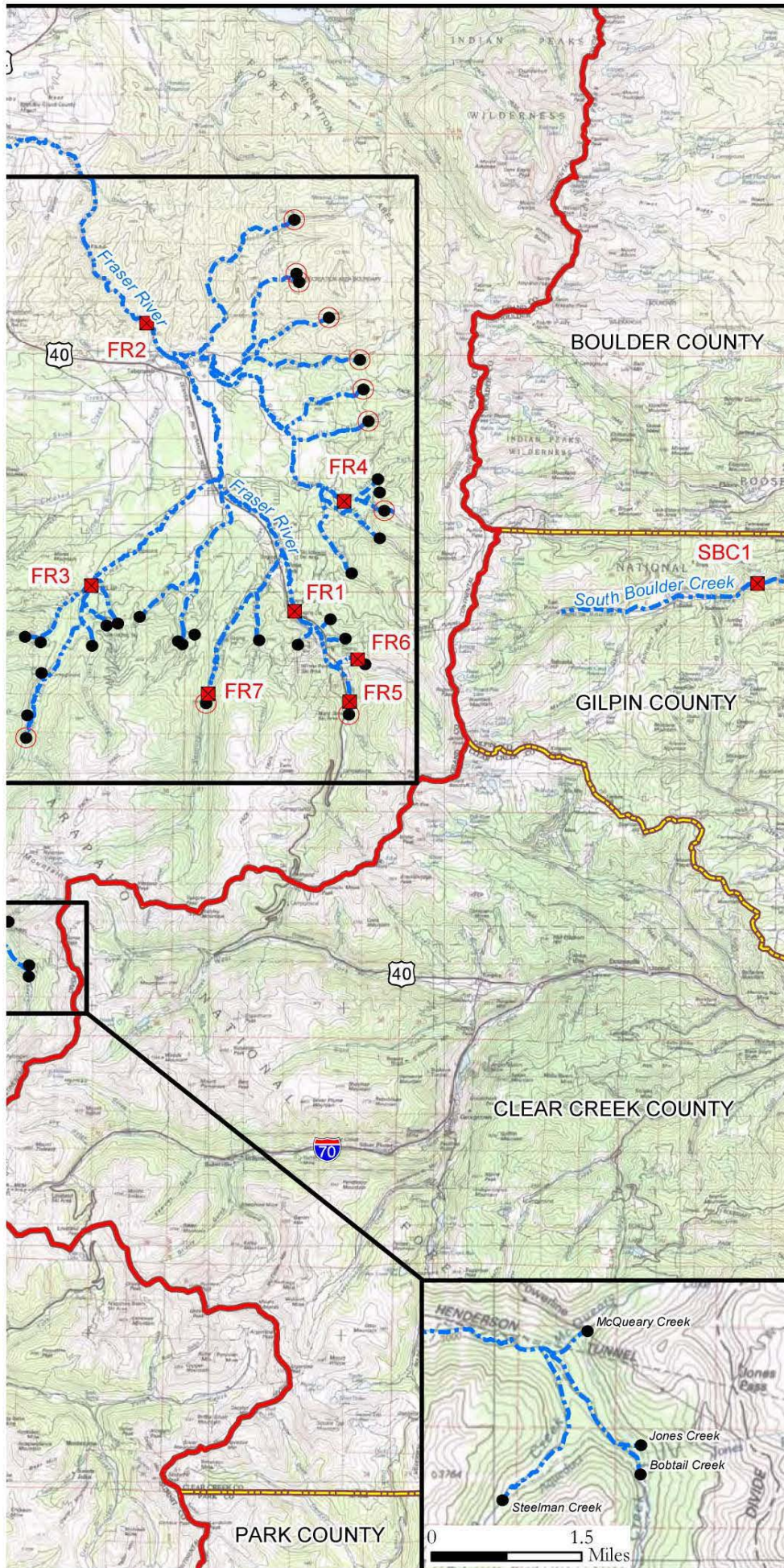


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Moffat Collection System
Project FEIS

Figure 6-1
Gross Reservoir
Components

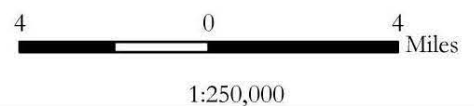




- Diversions
- USFS Bypass Flow Locations
- Representative Sampling Sites
- Overall Study Area Segments
- ▭ Counties
- Continental Divide

References:
 1:100,000-scale quad maps originally from USGS (1980s) and created with TOPOI, ©2006 National Geographic Maps, All Rights Reserved.

Diversions and bypass flows from Denver Water (2002).



Moffat Collection System
 Project FEIS

Figure 6-2
Study Area River
Segments - West Slope

Attachment B
Northern Goshawk and Northern Leopard Frog Survey Results
at Gross Reservoir

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Appendix C Northern Goshawk Survey Results by Call Station

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During the late summer of 2010, URS biologists conducted a field survey of the northern goshawk (*Accipiter gentilis*) and northern leopard frog (*Lithobates pipiens*) in habitats in the vicinity of Gross Reservoir. The purposes of these surveys were to identify the baseline status of these species and to assess the availability of habitat in the survey area and biologically affected area around Gross Reservoir. These surveys were conducted as a component of Denver Water's impact assessment for its proposal to enlarge the reservoir in order to resolve the water supply issues in its collection system.

The northern goshawk and northern leopard frog are categorized as sensitive species in a number of Forest Service regions, including the Rocky Mountain Region (Region 2). Each species can serve as indicator species of the ecological health of an area. The northern goshawk requires large areas of mature, unfragmented forest to successfully forage and reproduce in an area, and its presence or absence as a top predator can help to determine the health of a forest. The northern leopard frog requires several types of wetland habitat to complete its lifecycle, and its presence or absence can show whether or not the matrix of regional wetlands is maintaining its balance of native predator-prey species.

1.1 BACKGROUND NATURAL HISTORY

1.1.1 Northern Goshawk

The northern goshawk occurs throughout the Holarctic part of the northern hemisphere. Its distribution in North America roughly follows a boreal-cordilleran pattern that extends across most of Canada; the northern and western regions of the United States, including Alaska; and the Sierra Madre Occidental in Mexico (Squires and Reynolds 1997).

Northern goshawks once were thought to be old-growth specialist species. But recent studies have shown that goshawks broadly associate with a wide spectrum of forest types for foraging and nesting. Vegetation types utilized in the breeding range of the species include coniferous, temperate deciduous, and mixed forests. These can range in size and quality from extensive areas of mature forest to small patches with seral stands of aspen and conifers (Squires and Reynolds 1997). Foraging habitat within a home range includes a wide assortment of forest types and canopy structures that include dense interior stands, forest gaps, edge areas, and open stands (Squires and Reynolds 1997). Foraging site selection most likely is reflective of selection of stand type rather than prey availability during the breeding season but not during winter or the post-fledgling period (Kennedy 2003, Wiens et al. 2006). However, goshawks do tend to avoid areas with dense undergrowth, where maneuvering during foraging bouts would be limited (Kennedy 2003). The choice of nest sites is usually limited to the densest stands available within the capability of the forest type in an area. High canopy cover and low to moderately sloping terrain also seem to be important factors for nest site selection (Kennedy 2003). The size of forest patches used for nest areas appears to be highly variable across the species' range.

Goshawks select habitat according to a model of ideal free distribution modified and limited by territorial behavior (Fretwell 1972). Under the ideal free distribution model, individuals aggregate in a group of habitat patches proportionately to the amount of resources available in each. With territorial species, dominant individuals force sub-dominant individuals to use secondary habitats before primary areas are fully utilized.

Reynolds and Joy (1998) concluded that goshawks use this model because high-quality habitats retain a relatively stable number and density of territories that is independent of the fluctuations of prey species. Changes in a regional goshawk population would primarily occur in marginal areas, but a large decrease in the population within primary habitats would be indicative of a fundamental widespread collapse of prey species or disturbance to the primary habitat.

The northern goshawk appears to be a local breeding resident in forests around Gross Reservoir. Surveyors for The Colorado Breeding Bird Atlas (Kingery 1998) confirmed breeding northern goshawks in survey blocks northwest and southwest of Gross Reservoir in the surveys conducted between 1987 and 1995. The northern goshawk occurred in survey blocks northeast and southeast of Gross Reservoir during this same period. A goshawk pair indicated probable breeding in the northeast block and an observed pair of goshawks indicated possible breeding in the southeast block. In the updated Colorado Breeding Bird Survey (2007-2010), the available results document a territorial response from a goshawk (probable breeding) in the survey block lying southeast of Gross Reservoir. URS received a reported sighting of a northern goshawk that was seen on Winiger Ridge in early summer 2010.

1.1.2 Northern Leopard Frog

Northern leopard frogs have a complex life history that requires different habitat types in proximity to fulfill the unique requirements for eggs and tadpoles, sub-adults, and adults. Breeding typically occurs in ephemeral or perennial ponds or backwaters isolated from a main stream (Smith and Keinath 2007). These typically have a number of characteristics important for successful breeding and development of offspring (Smith and Keinath 2007).

- Water is two meters deep or less and is not covered by a tree canopy, which helps to provide a warm environment for developing eggs and tadpoles.
- The size of the water body is typically less than 8 hectares in size and can dry periodically, which helps to limit the presence of predators.
- The breeding pond usually has a muddy bottom and emergent and submergent vegetation, which provide attachment sites for eggs and escape cover for tadpoles.
- The water body does not have predators (bullfrogs, predaceous fish, and crawfish), which enables survival of eggs and tadpoles.

After metamorphosis, sub-adult northern leopard frogs will migrate to feeding habitat, which includes surrounding lakes or stream habitats. Sub-adults move to these sites using corridors along streams or overland routes. Post-juvenile dispersal along streams seems to occur faster and farther than through upland areas (Smith and Keinath 2007).

After breeding, adult northern leopard frogs move from breeding ponds to upland sites that typically include mesic grasslands and wet meadows. Adults usually avoid wooded areas, overgrazed pastures, sites with bare ground, and grassy habitats with vegetation more than a meter high (Smith and Keinath 2007). This seasonal movement can range from a few meters to more than three kilometers (Smith and Keinath 2007).

In the fall, sub-adult and adult northern leopard frogs migrate again to overwintering habitats that include streams and ponds that do not freeze completely during the winter. Lakes with introduced predaceous fish are unsuitable as overwintering habitat. Known fish species in this category include trout species, all of which eat tadpoles and probably eggs; northern pike (*Esox lucius*) that feed on adults and sub-adults; and sunfish and bass that will feed on tadpoles and sub-adults (Smith and Keinath 2007). Introduced predaceous fish in Gross Reservoir are listed as follows:

- rainbow trout (*Oncorhynchus mykiss*)
- brown trout (*Salmo trutta*)
- brook trout (*Salvelinus fontinalis*)
- lake trout (*Salvelinus namaycush*)
- splake (lake-brook hybrid)
- tiger muskie (northern pike-muskie hybrid)

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2.1 NORTHERN GOSHAWK SURVEY

The goshawk survey design followed the modified Kennedy-Stahlecker protocol (Kennedy and Stahlecker 1993, Joy et al. 1994, Watson et al. 1999) for broadcast acoustical survey. The survey layout included parallel transects set 200 meters apart. Stations on adjacent transects were offset by 100 meters to improve coverage of the broadcast calls.

URS biologists conducted two rounds of surveys in 2010. The first round was conducted between 21 July and 30 July 2010 and included the prioritized survey area described previously. The second round included a focused survey on Winiger Ridge, where a goshawk was detected during the first round of survey, which also included an observation of a goshawk earlier in 2010. This second survey period was completed on 10 August 2010. Repeated surveys increase the likelihood of detection of goshawks (Woodbridge and Hargis 2006), and the purpose of the second survey was to attempt to delimit an area of use on Winiger Ridge.

The broadcast protocol at each station also followed the Kennedy-Stahlecker standardized protocol. A juvenile a begging call or a female wail call was broadcast at three 120 degrees intervals – the first along the transect line, the second at 120 degrees to the right of the first broadcast, and the third 120 degrees to the right of the second broadcast. During each interval, the call was broadcast for 10 seconds, and two surveyors listened and looked for a response from goshawks for 30 seconds thereafter. When no goshawk was detected, the procedure was repeated through a second cycle at the call station. As the two surveyors walked from one station to the next, they looked and listened for goshawk activity, calls, and sign (whitewash, feathers, prey remains, nests, plucking sites, etc.). Survey each day began within an hour after sunrise and finished between 15:00 and 17:35 each day. The standard data was recorded electronically into a geodatabase for the survey (Woodbridge and Hargis 2006). The data fields, values, and descriptions thereof are presented in Table 1.

Table 1
Goshawk Survey Data Entered into Electronic for Broadcast Call Field Survey

VARIABLE	VALUES	CODE DESCRIPTION
Point	<i>R#C#</i>	Row-Column number of calling station
ID	<i>GPS database ID</i>	Unique number given to each record in the database
MARKED	<i>Yes/No</i>	ID# marked on map?
DETECTION TYPE	(Description of detection)	
	<i>SWW</i>	Single patch of whitewash
	<i>MWW</i>	Multiple patches of whitewash
	<i>SPR</i>	Single prey remains (single prey item)
	<i>MPR</i>	Multiple prey remains (as in plucking post)
	<i>SMF</i>	Single molted feather from goshawk
	<i>MMF</i>	Multiple molted feathers from goshawk
	<i>SGOS</i>	Silent visual detection of goshawk
	<i>VGOS</i>	Vocal detection of goshawk

Table 1 (cont.)
Goshawk Survey Data Entered into Electronic for Broadcast Call Field Survey

VARIABLE	VALUES	CODE DESCRIPTION
	<i>BGOS</i>	Both vocal and visual detection of goshawk
	<i>OSN</i>	Inactive stick nest—goshawk characteristics
	<i>ANY</i>	Active goshawk nest with young
	<i>ANF</i>	Active nest with young already fledged
	<i>NA</i>	Not Applicable/ Other
COUNT	<i>Integer, 1-10</i>	Number of goshawks observed
AGE (Age of birds detected)		
	<i>A</i>	Adult
	<i>J</i>	Juvenile
	<i>N</i>	Nestling
	<i>U</i>	Age unknown
D-LOC (Location of detections)		
	<i>CP</i>	Detection occurred at call station
	<i>TL</i>	Detection occurred along transect
LOC	<i>UTM Value</i>	UTM coordinates of observation (<i>generated by GPS</i>)
ICB	<i>0-360</i>	Compass bearing of initial detection
LCB	<i>0-360</i>	Compass bearing of departing goshawk
WIND CODE (Wind speed)		
	<i>1</i>	Smoke rises (<1 mph)
	<i>2</i>	Smoke drifts due to breeze (1-3 mph)
	<i>3</i>	Leaves rustle, breeze felt on face (4-7 mph)
	<i>4</i>	Leaves and small twigs in constant motion (8-12 mph)
	<i>5</i>	Raises dust, small branches in motion (>12 mph)
CLOUD COVER CODE (Percent coverage by clouds)		
	<i>1</i>	<5%
	<i>2</i>	5-20%
	<i>3</i>	21-40%
	<i>4</i>	41-60%
	<i>5</i>	61-80%
	<i>6</i>	81-100%

The survey was conducted by a pair of surveyors. One surveyor performed the broadcast calls using a Pyle-Pro 40-watt megaphone (rated with a range of 1,000 yards) attached to an MP3 player. The other surveyor recorded the standardized data and call results in electronic format on a Trimble GeoExplorer XH GPS unit. The database of call results is included as Appendix C to this report.

Prior to fieldwork, the survey stations were gridded and mapped in ArcGIS at the aforementioned intervals. Stations that were within or slightly outside the Gross Reservoir study area for the Moffat Project EIS were selected for initial inclusion in the survey, which totaled 107 call stations. The stations were labeled by the row and column position of each. Index maps were printed and the mapped station locations were added to the GPS unit's database to assist surveyors in locating survey stations in the field.

After an initial field trial, the call stations were ranked to enable completion of two rounds of survey within the post-breeding season deadline of August 15. Stations excluded from the survey included those outside the study area boundary, those with little or no tree cover, and those that were inaccessible or unsafe to survey. The call stations that occurred on U.S. Forest Service (USFS) land within the study area were formally prioritized with a focus on habitat quality (density of tree canopy), slope, and location relative to the proposed impact area. Call sites were categorized as high, medium, and low priority using these criteria. Those stations occurring on Denver Water property were surveyed according to the same criteria but were not formally ranked. The reasoning behind the formal prioritization on USFS land and not Denver Water property was due to the goshawk having a sensitive species designation on USFS lands and not on Denver Water property. Representative photographs of prioritized call stations are shown in Appendix B.

Further adjustments were made to call stations during the field sessions. Some call stations were offset or eliminated because of inaccessible or dangerous terrain. In contrast, a few call stations were added in the field that were slightly outside the study area, because the habitat and accessibility were favorable. A number of the call stations had position errors that resulted from GPS inaccuracies due to the topography and poor satellite geometry. A total of 81 call stations were surveyed during the first round of survey. Twelve call stations, including four stations not surveyed in the first round, were surveyed during the second round of survey on Winiger Ridge. The survey results are summarized as a table in Appendix C

2.2 NORTHERN LEOPARD FROG SURVEY

The northern leopard frog survey utilized a visual occurrence methodology. The timing of the survey was after the breeding season, and a call survey was inapplicable. Habitats surveyed included shallow backwater habitats (riparian and wetland sites) for juveniles, and shallows of Gross reservoir and surrounding drainages (areas with riparian or wetland habitat) for adults and sub-adults.

Based on the natural history of the species, it was expected that the northern leopard frog (if present) would be active both day and night within the Gross Reservoir study area, and a diurnal survey would adequately survey for the species. Survey sites included upper South Boulder Creek, Winiger Gulch, Forsythe Canyon, and three other un-named riparian drainages. Select riparian and wetland areas mapped by URS that occurred along the shore

of Gross Reservoir also were examined for suitability as habitat for northern leopard frogs. Upland grass/forb areas were assessed for habitat quality but were too dry to be suitable for adult northern leopard frogs. Points to indicate general inventory areas were recorded on a Trimble GeoExplorer XH GPS unit and a back-up Garmin Oregon 550 GPS unit.

3.1 NORTHERN GOSHAWK

During the first round of the northern goshawk survey, a single goshawk responded to calls broadcasted at station R19, C11 on Winiger Ridge (see Appendix A, Index Map 8). This individual flew to the call station from the northeast during the first repetition of the call, circled overhead, and then retreated to the northwest over Winiger Ridge. No further signs of northern goshawks (nests, prey remains, plucking stations, etc.) were observed along transects.

During the second round of survey, the focused survey on Winiger Ridge included 12 call stations. No northern goshawks responded at any of the call stations, and two red-tailed hawks (*Buteo jamaicensis*) responded repeatedly to calls near the summit of Winiger Ridge.

The total number of raptors observed during the survey included one northern goshawk, three red tailed hawks, and one American kestrel (*Falco sparverius*). Also, the partial remains of a northern saw-whet (*Aegolius acadicus*) were located near the shore of Gross Reservoir next to call station R4, C12, but the identification of the predator was unknown.

3.2 NORTHERN LEOPARD FROG

The visual surveys for the northern leopard frog in drainages around Gross Reservoir and along parts of the shoreline of the reservoir yielded negative results. No northern leopard frogs were seen in the drainages or along the shoreline of Gross Reservoir. Table 1 summarizes habitats assessed in the surveyed areas, and Appendix A shows typical habitat conditions at mapped areas that were surveyed for northern leopard frogs.

Table 2
Summary of Northern Leopard Frog Survey Results at Gross Reservoir

Area	Map No. and Site ID	Representative UTM Coordinates (Zone 13N)	Habitat Evaluation	Potential Habitat	Observed Frogs
Forsythe Canyon	1: A, B, C, D, E, F	0467488.0376 4423017.5570	Pools in shallow stream, cool, shady forest overstory.	None	None
North Shore of Gross Reservoir	1: G, 6, 8 2: H	0467956.0558 4422820.6900	Steep, rocky bottom, limited emergent vegetation at high water mark.	None	None
Winiger Ridge (burn area)	1: K, L	0467920.2342 4422172.6690	Grassy, narrow spring-fed stream in ravine with dense herbaceous vegetation, no forest overstory.	Mediocre adult habitat (only present since 2003 prescribed burn).	None
Winiger Gulch	3: M, N, O, P, 13	0467132.5160 4421610.1760	Shallow muddy bottom at reservoir edge, heavy population of crawfish. Gulch interspersed with woody and grassy vegetation.	No breeding habitat, Mediocre adult habitat in gulch.	None

Table 2 (cont.)
Summary of Northern Leopard Frog Survey Results at Gross Reservoir

Area	Map No. and Site ID	Representative UTM Coordinates (Zone 13N)	Habitat Evaluation	Potential Habitat	Observed Frogs
South Boulder Creek	3: R, S, T 5: U, V, W, X	0466308.1643 4420804.7000	Extremely fast flowing with rapids. Few to no pools, no backwaters.	None	None
West Tributary	5: Q	0467478.8881 4420599.6820	Dense woody vegetation, small, narrow, intermittent stream.	None	None
Middle Tributary	6: 12	0467923.0901 4420581.0710	Dense woody vegetation, small, narrow, intermittent stream.	None	None
East Tributary	6:15	0468383.4457 4420616.0230	Dense woody vegetation, small, narrow, intermittent stream.	None	None
Boat Launch Area	3: J 6 - I	0468172.7608 4420831.7370	Rocky and sandy bottom at boat launch, without vegetation. Inlet with rocky and sandy bottom with emergent vegetation at high water mark only.	None	None

No breeding habitats for the northern leopard frog seem to occur in and around Gross Reservoir. No ponds are located within the study area. The nearest potential breeding ponds are located more than three miles north at Kossler Lake and about three miles west at stock tank impoundments. The depth and size of Gross Reservoir and would preclude it as adequate breeding habitat, and the presence of introduced predators would further lessen the likelihood of successful reproduction or overwintering in the reservoir.

No amphibians were observed during the field surveys. Three reptile species were observed. Eastern fence lizards (*Sceloporus undulatus*) were relatively common among the sunny forest openings throughout the study area. A western terrestrial gartersnake (*Thamnophis elegans*) was observed near the reservoir's shore near the R4, C12 goshawk call station. A smooth green snake (*Opheodrys vernalis*) was observed in a forest opening near the R20 ,C10 goshawk call station.

Limited habitat for adult northern leopard frogs is of marginal quality and occurs where isolated areas of grassy vegetation grow along Winiger Gulch and in the prescribed burn site on Winiger Ridge. Mesic patches of meadow vegetation are small and greatly isolated from possible breeding ponds (more than three miles away). The distance to these possible breeding ponds is beyond the usual dispersal range of the species, and dispersal most likely would be prevented by unsuitable, intervening habitat.

Secondary sub-adult habitat was evaluated along a stream in Forsythe Canyon. The stream in this canyon area had numerous shallow pools that were typically less than 30 centimeters (12 inches) deep. The water was clear and a dense, shady canopy of riparian trees covered

most of the channel. This stream appeared too shallow and seemed to offer little concealment for sub-adult leopard frogs. It also seemed to be too cool and not productive enough for post-juvenile growth. All other streams in the study area, including South Boulder Creek, were of poorer quality and likely wouldn't support any life stage of the northern leopard frog.

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Results of the northern goshawk survey indicated that the study area around Gross Reservoir is used by the species. However, the site seems to be limited in its potential as breeding habitat, largely because of the lack of tree stands with dense canopy cover that also occur on moderate terrain. However, according to breeding bird survey results, the northern goshawks do breed at a larger regional scale outside the study area. Dense stands of forest around Gross Reservoir typically are limited to steep, north-facing slopes, which are not typically used as nesting habitat by the northern goshawk. However, the study area likely provides suitable foraging or post-fledgling habitat, but the extent of use could not be confirmed by this study.

Northern Goshawk habitat in the study area around Gross Reservoir appeared to be adequate for foraging in a number of areas. Dense stands of mixed conifer forest occurred alongside Forsythe Canyon; over Winiger Ridge; and above South Boulder Creek (both above the reservoir and below the dam). With the exception of Winiger Ridge, the terrain in these areas is likely too steep to be suitable for nesting habitat. The portion of Winiger Ridge in the study area receives a great deal of activity from recreationists, which would reduce the potential of nesting in that region as well.

Results of the northern leopard frog survey indicated that habitat for the species is largely absent from the study area. No frogs were observed in the survey sites, and no breeding, overwintering, or sub-adult post dispersal habitat exists in the study area. Smaller patches of adult post-breeding habitat occur in Winiger Gulch and in the Winiger Ridge prescribed burn area, but these areas are isolated from any potential breeding ponds by inhospitable vegetation and also are farther than the longest dispersal distances known for the species. The available habitats in the study area do not provide the mosaic of conditions needed for the northern leopard frog to complete its life cycle near Gross Reservoir, and the species is not expected to occur there.

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URS is grateful for the assistance of the staff at Gross Reservoir in facilitating the completion of this project. The public safety personnel provided guidance on safe travel and passable roads around the reservoir. Officer Holden, our initial contact, was exceptional in this regard. The caretakers were invaluable with providing boat rides to numerous survey areas. Dale Beverly was particularly helpful in organizing these efforts for the URS surveyors.

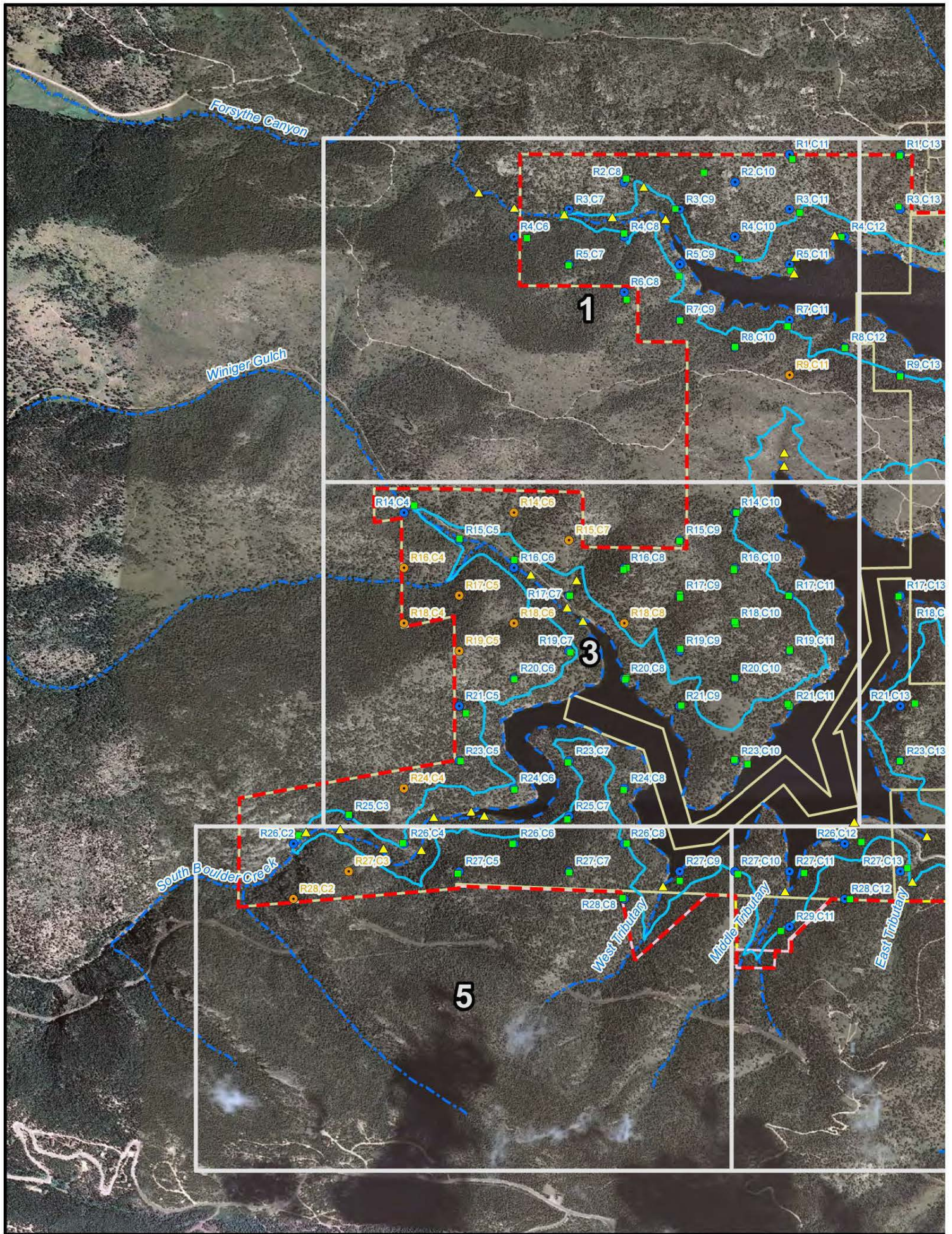
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- Fretwell, S. D. 1972. Populations in a seasonal environment. Princeton University Press, Princeton, NJ, 224 pp.
- Joy, S.M., Reynolds, R.T., Leslie, D.G. 1994. Northern goshawk broadcast surveys: hawk response variables and survey cost. *Studies in Avian Biology*. 16: 24-30.
- Kennedy, P.L. 2003. Northern Goshawk (*Accipiter gentiles atricapillus*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/northerngoshawk.pdf> [Accessed September 2010].
- Kennedy, P.L., Stahlecker, D.W. 1993. Responsiveness of nesting northern goshawks to taped broadcasts of 3 conspecific calls. *Journal of Wildlife Management*. 57: 249- 257.
- Kingery, Hugh E. (ed.). 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife.
- Reynolds, R.T. and S.M. Joy. 1998. Distribution, territory occupancy, dispersal and demography of northern goshawks on the Kaibab Plateau, Arizona: Final Report. Natural Heritage Project No. I94045. Arizona Game and Fish Department, Phoenix, AZ.
- Smith, B.E. and D.A. Keinath. (2007, January 16). Northern Leopard Frog (*Rana pipiens*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/northernleopardfrog.pdf> [Accessed September 2010].
- Squires, J.R. and R.T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/298>.
- Wiens, J.D., B.R. Noon, and R.T. Reynolds. 2006. Post-fledging survival of northern goshawks: The importance of prey abundance, weather, and dispersal. *Ecological Applications*, 16, 406-418.
- Watson, J.W., Hays, D.W., Pierce, D.J. 1999. Efficacy of northern goshawk broadcast surveys in Washington State. *Journal of Wildlife Management*. 63: 98-106.
- Woodbridge, B., Hargis, C.D. 2006. Northern goshawk inventory and monitoring technical guide. Gen. Tech. Rep. WO-71. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 pp.

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Appendix A
Index Maps for Northern Goshawk and Northern Leopard Frog Surveys
at Gross Reservoir

Figures start on the following page





- ▲ Northern Leopard Frog Survey Location
- Goshawk Survey Location
- Goshawk Grid Point Surveyed
- Goshawk Grid Point Not Surveyed (USFS Land)
- Goshawk Grid Point Not Surveyed (Denver Water Land)

3, 8/10/2010 - Survey Data and Number
 R9,C12 - Goshawk Grid Point Number

Alternatives

- Existing Gross Reservoir
- Alt. 1a Gross Reservoir with Environmental Pool - 77,000 AF Enlargement

Project Information

- Gross Reservoir Moffat EIS Study Area
- Denver Water Board
- USDA Forest Service - Arapaho & Roosevelt National Forest
- Private or Right of Way
- Stream/River
- Tiles (1:4,800)

Reference:
 Aerials from USDA-NRCS, 2009.

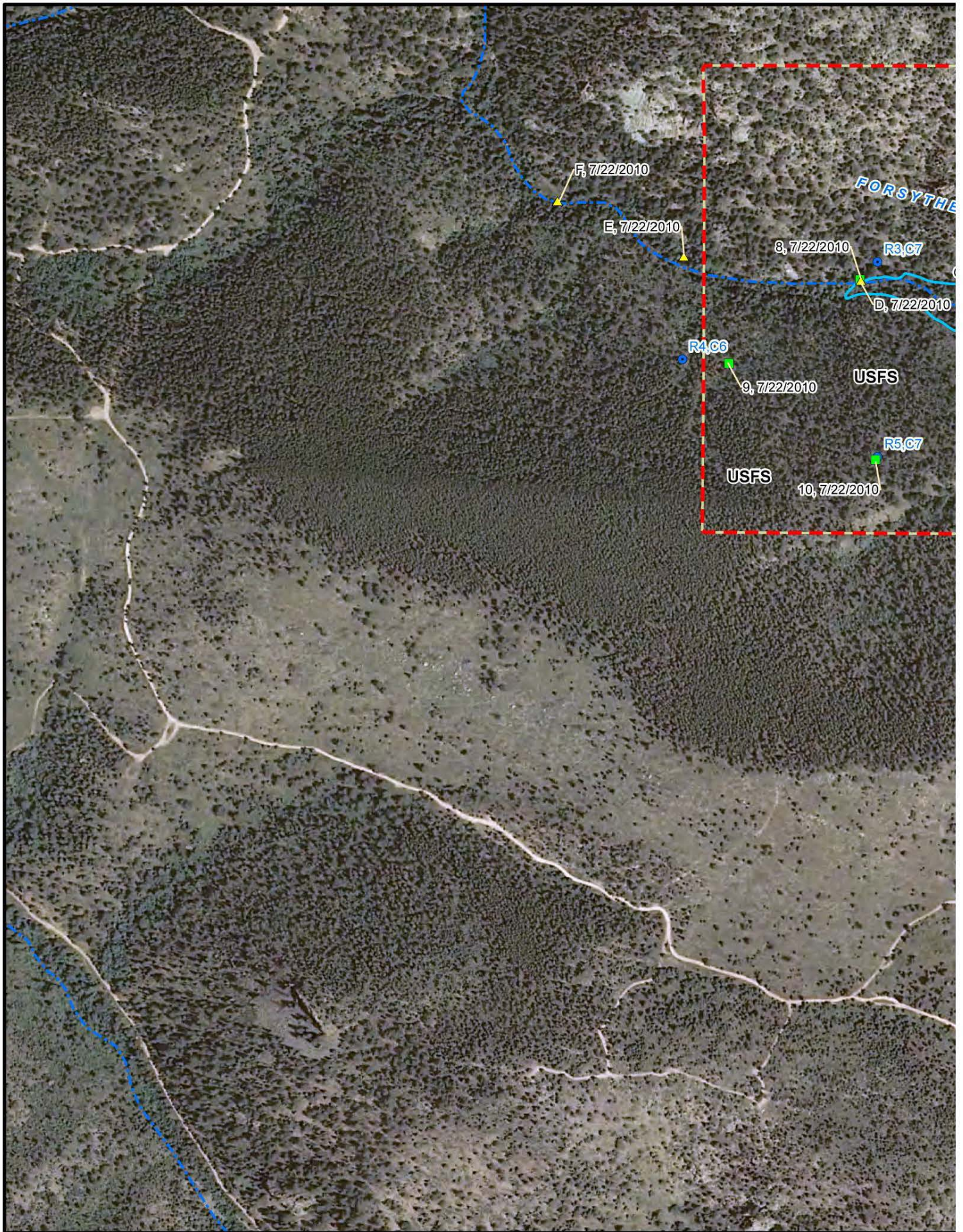
Land ownership from Boulder County (2006) and Denver Water (2008).

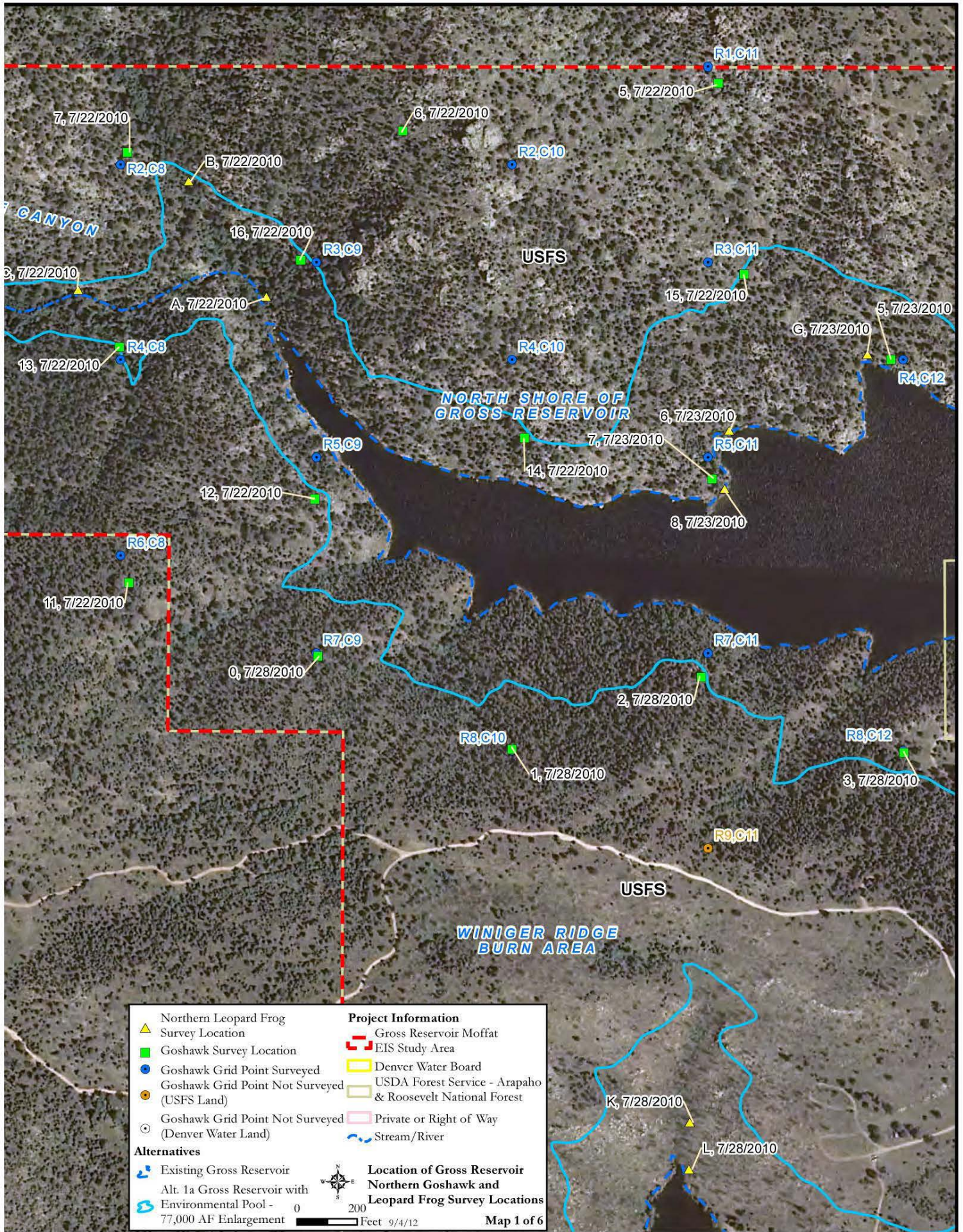


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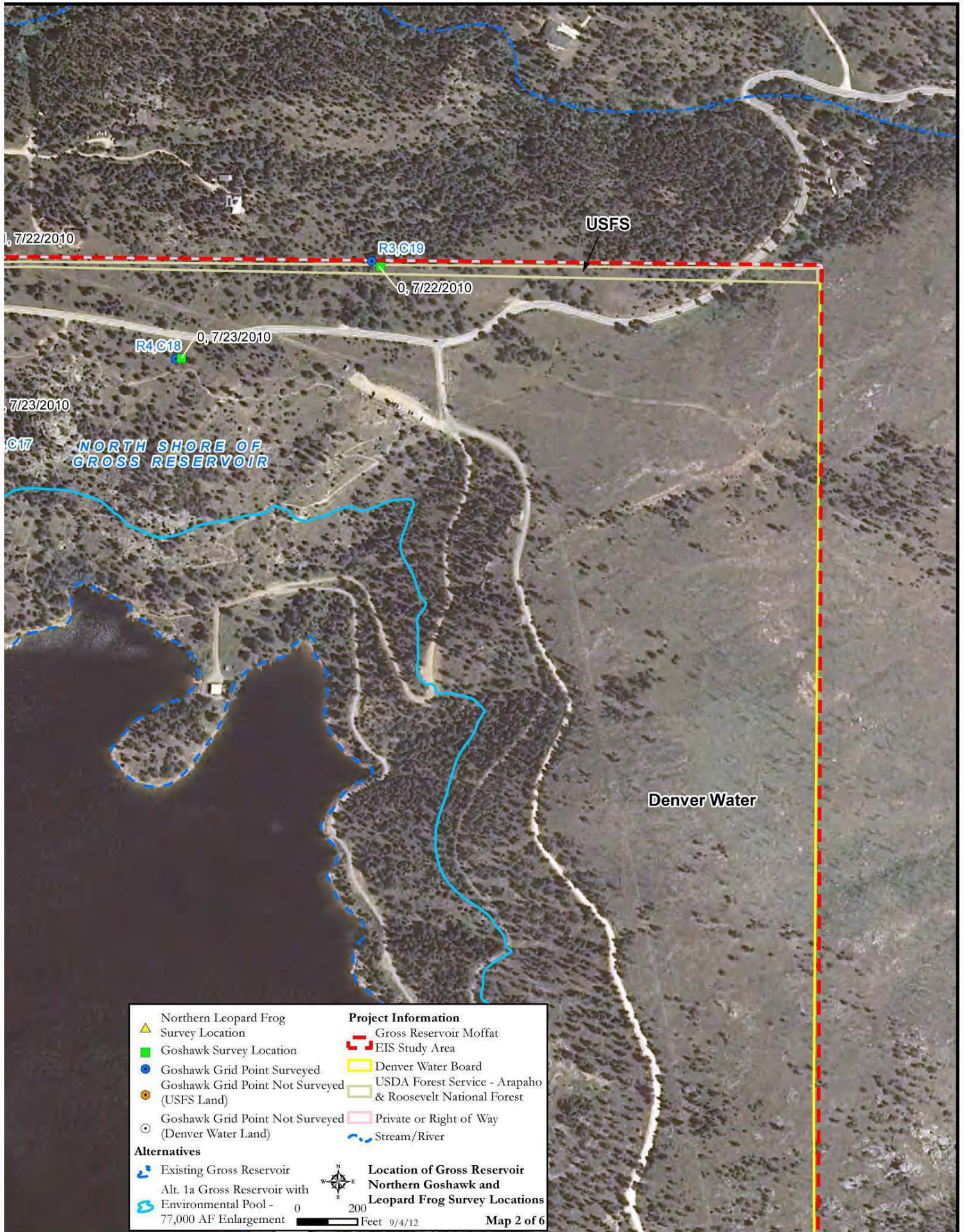
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 Project FEIS

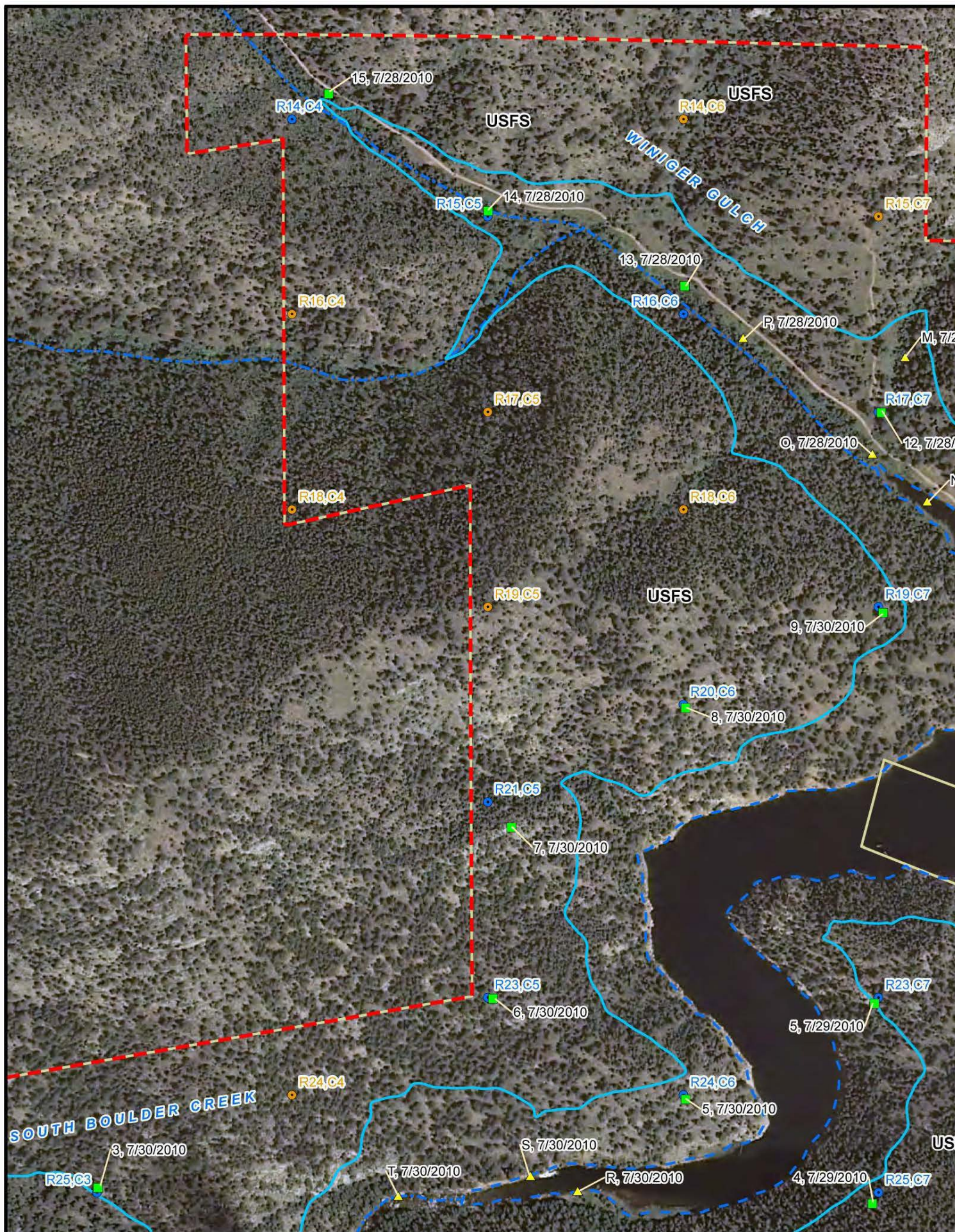
Location of Gross Reservoir
 Northern Goshawk and Leopard
 Frog Survey Locations
 Index Map

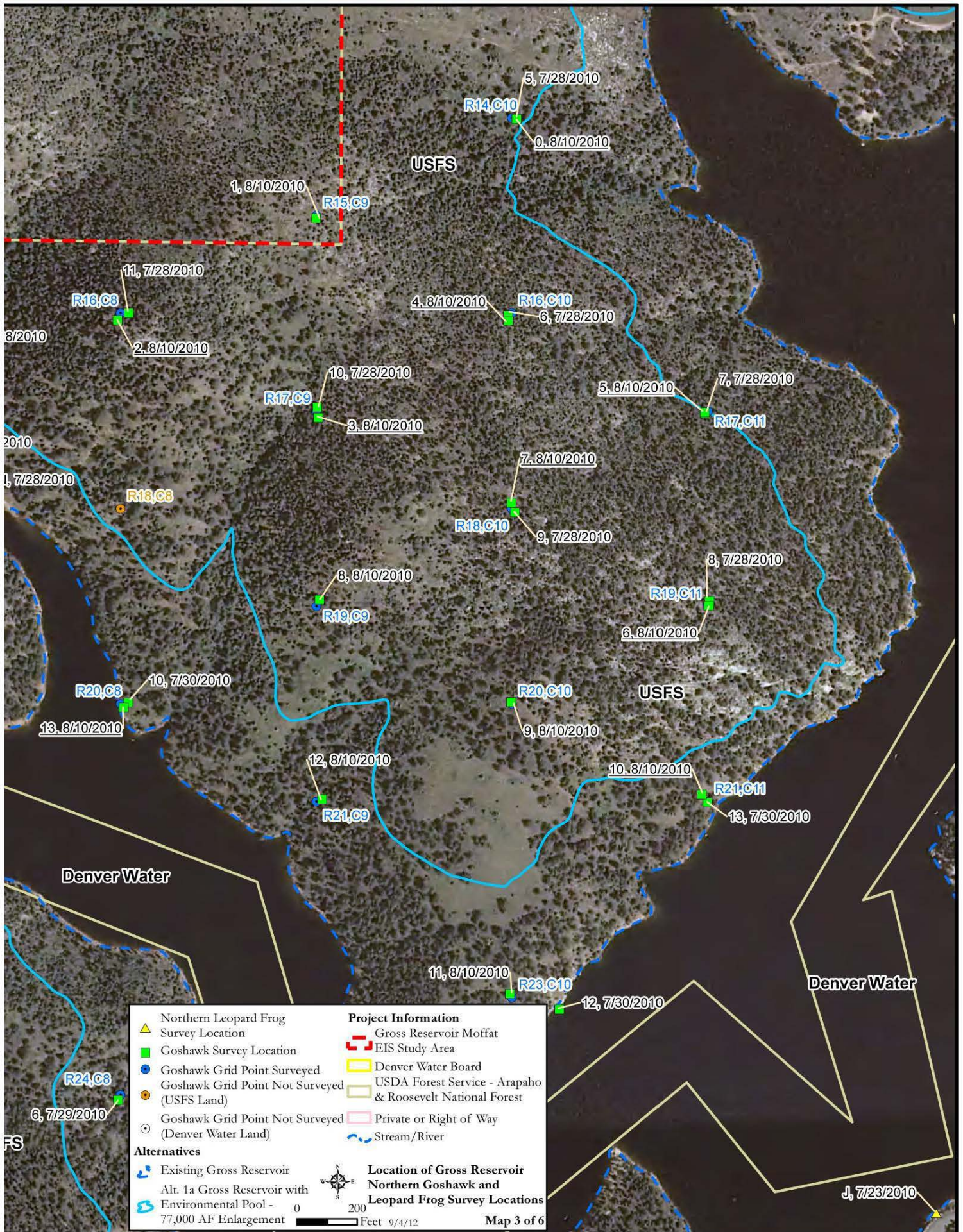


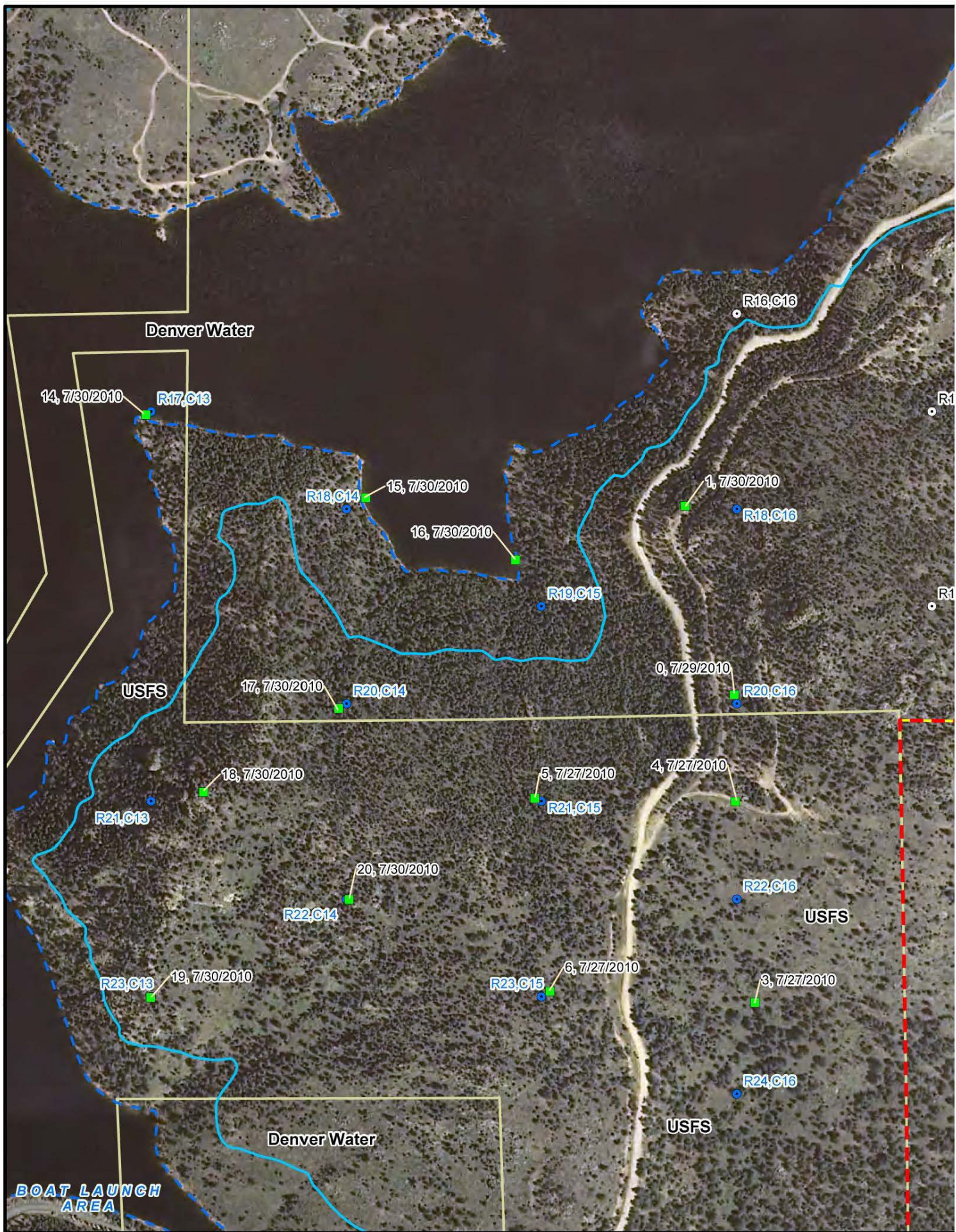


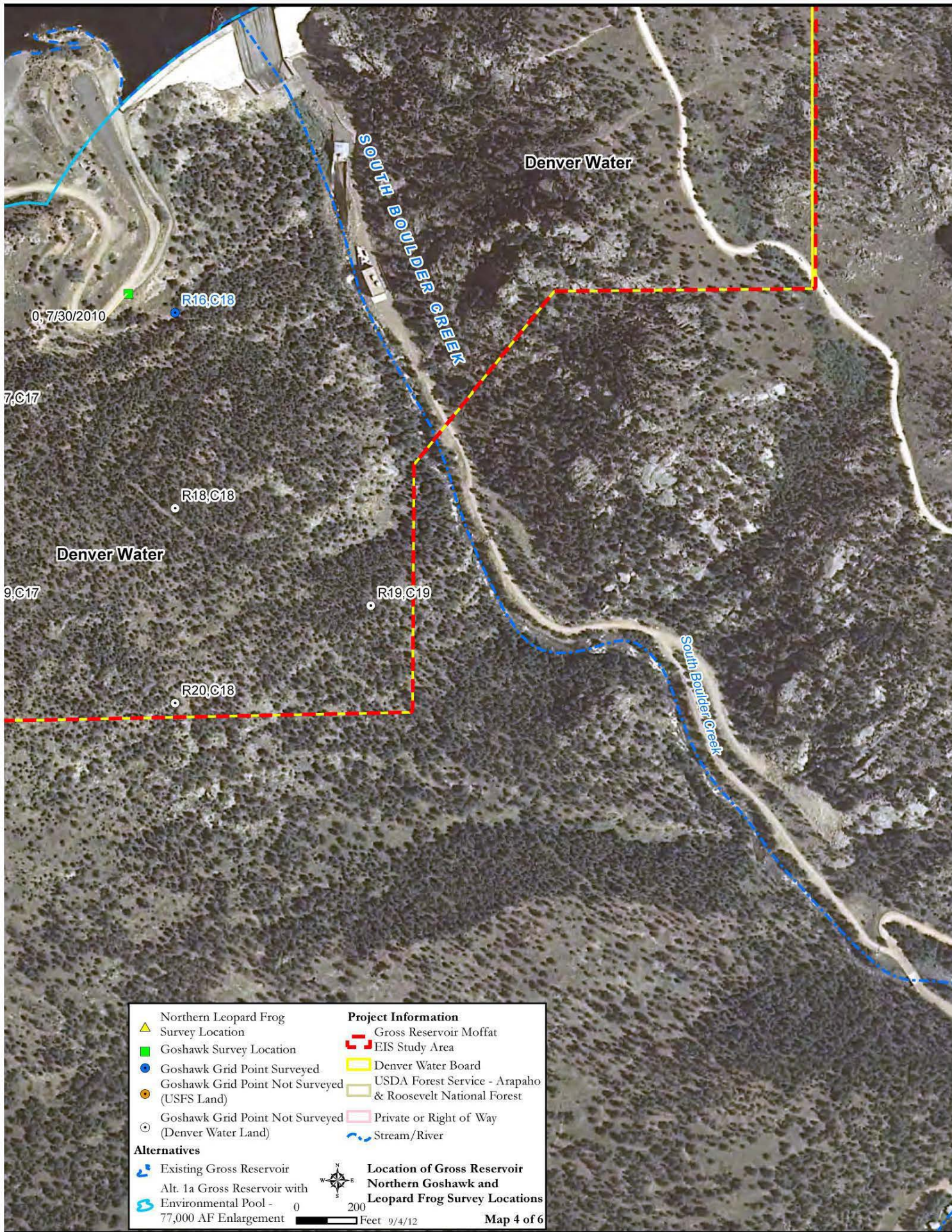


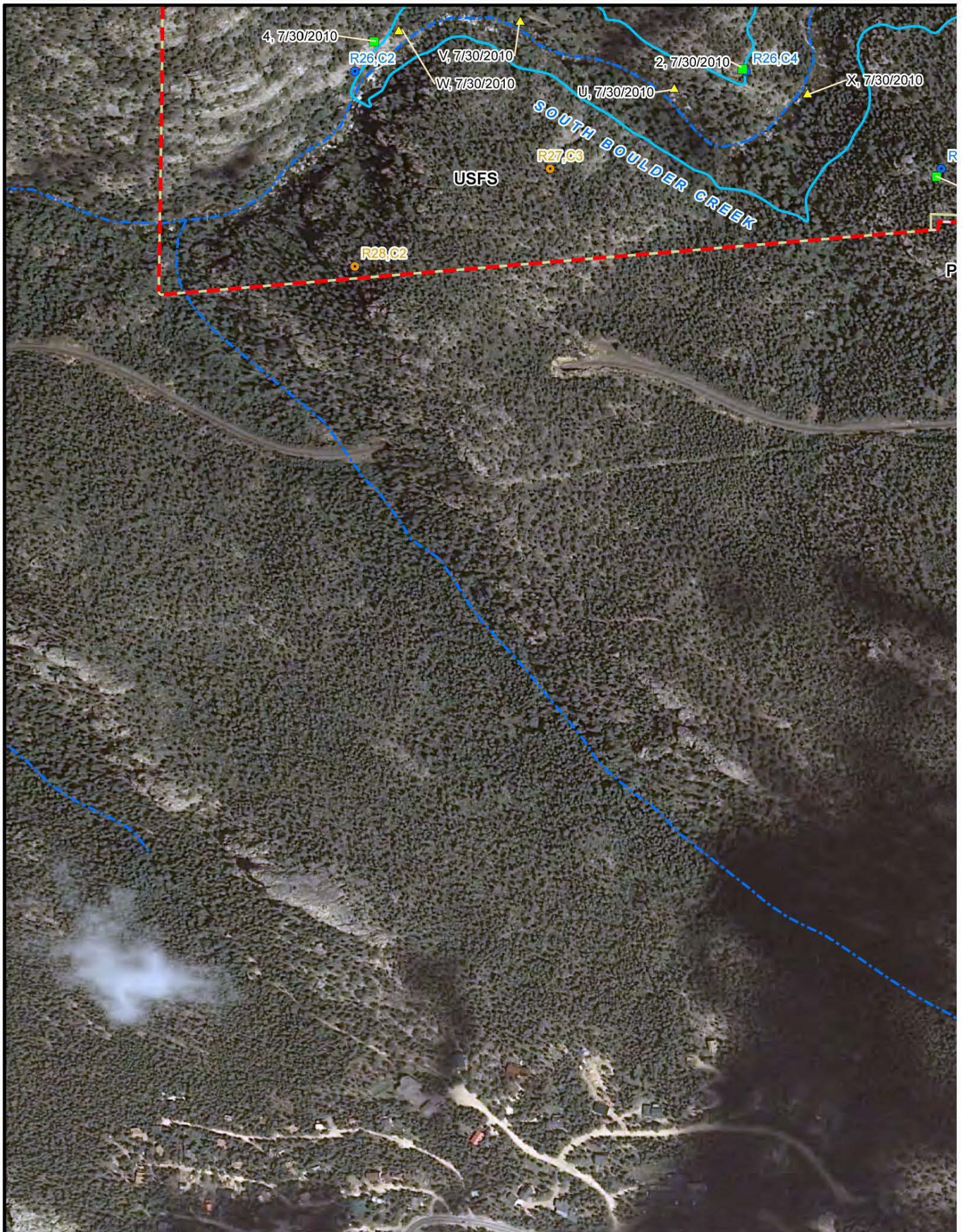


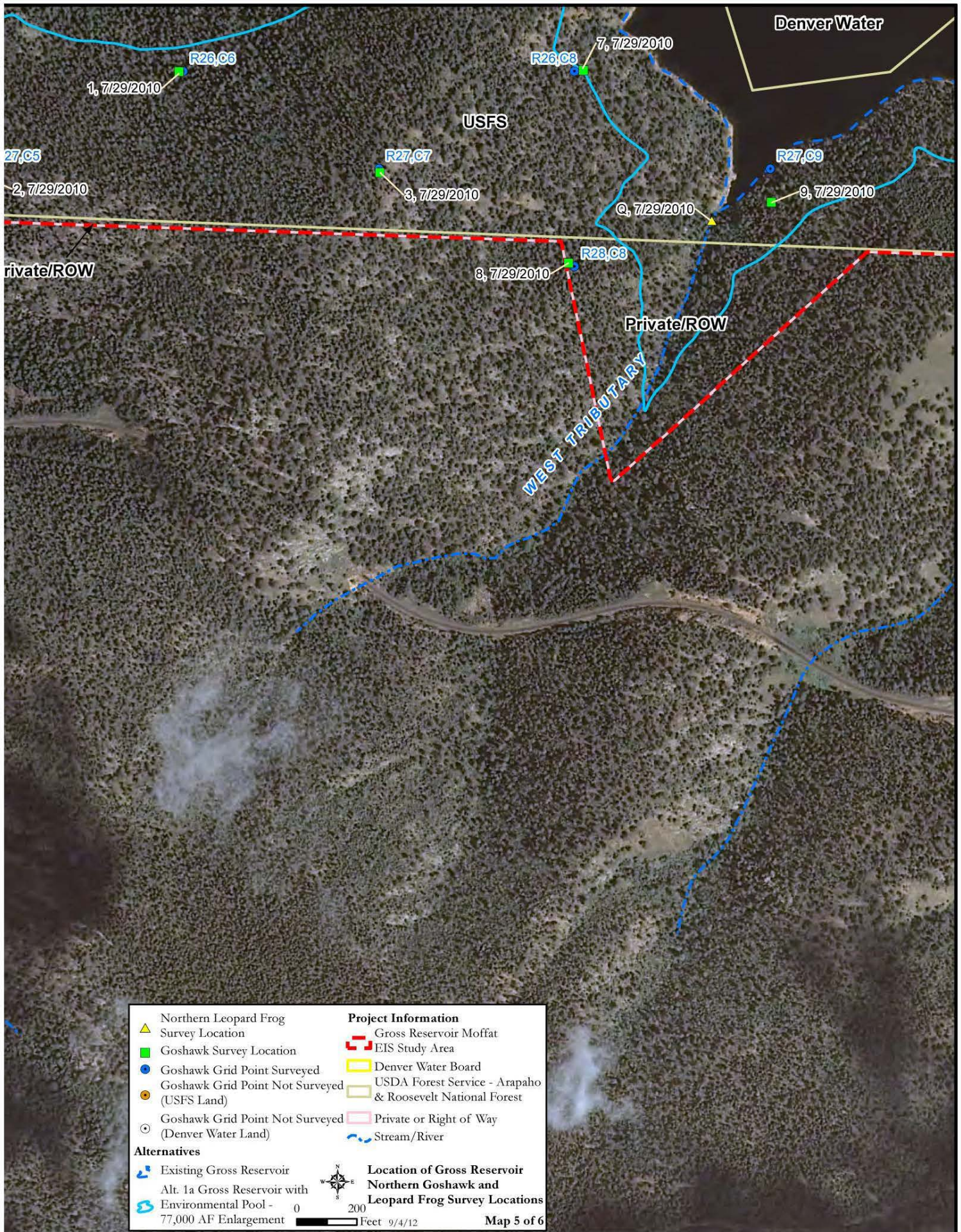


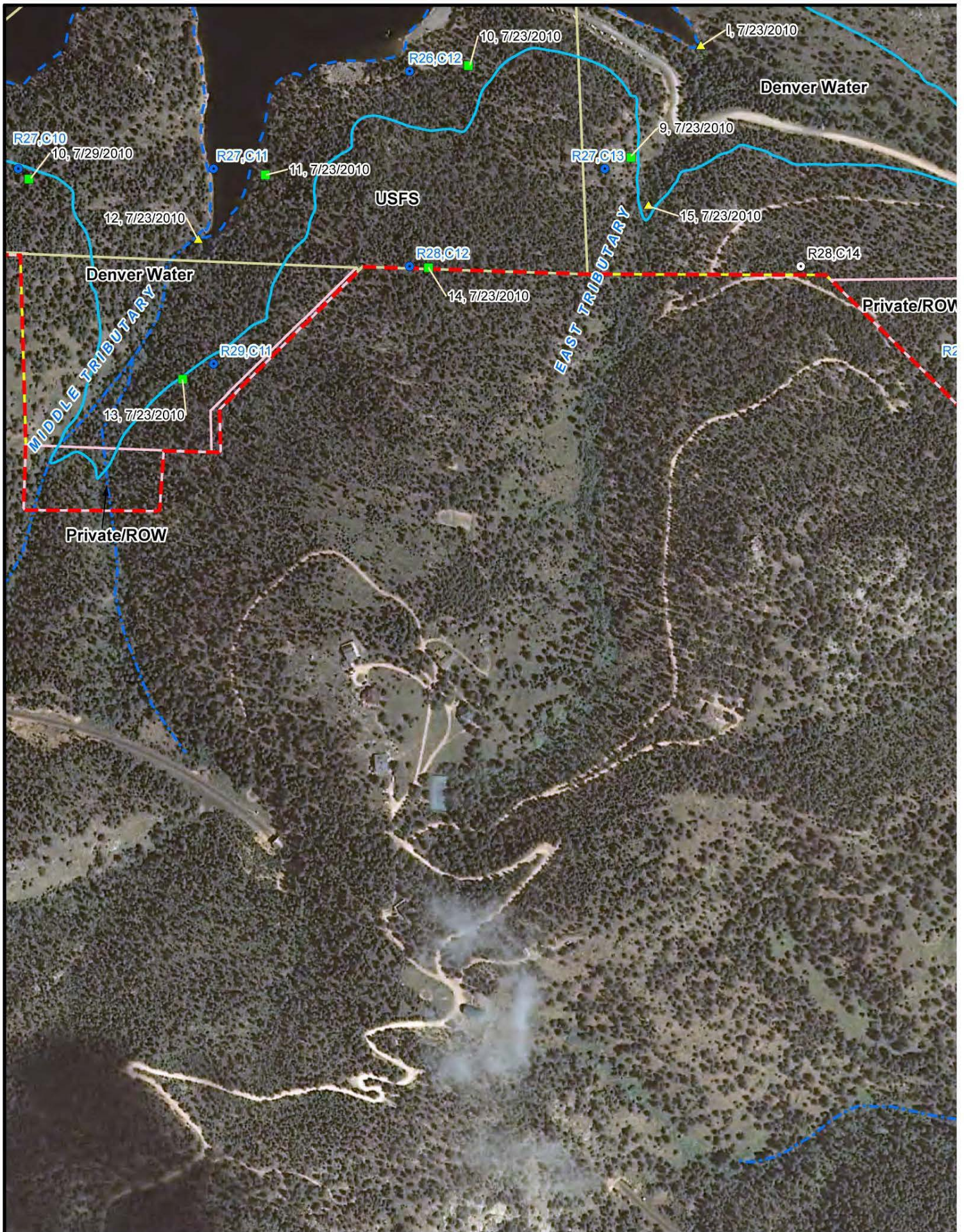


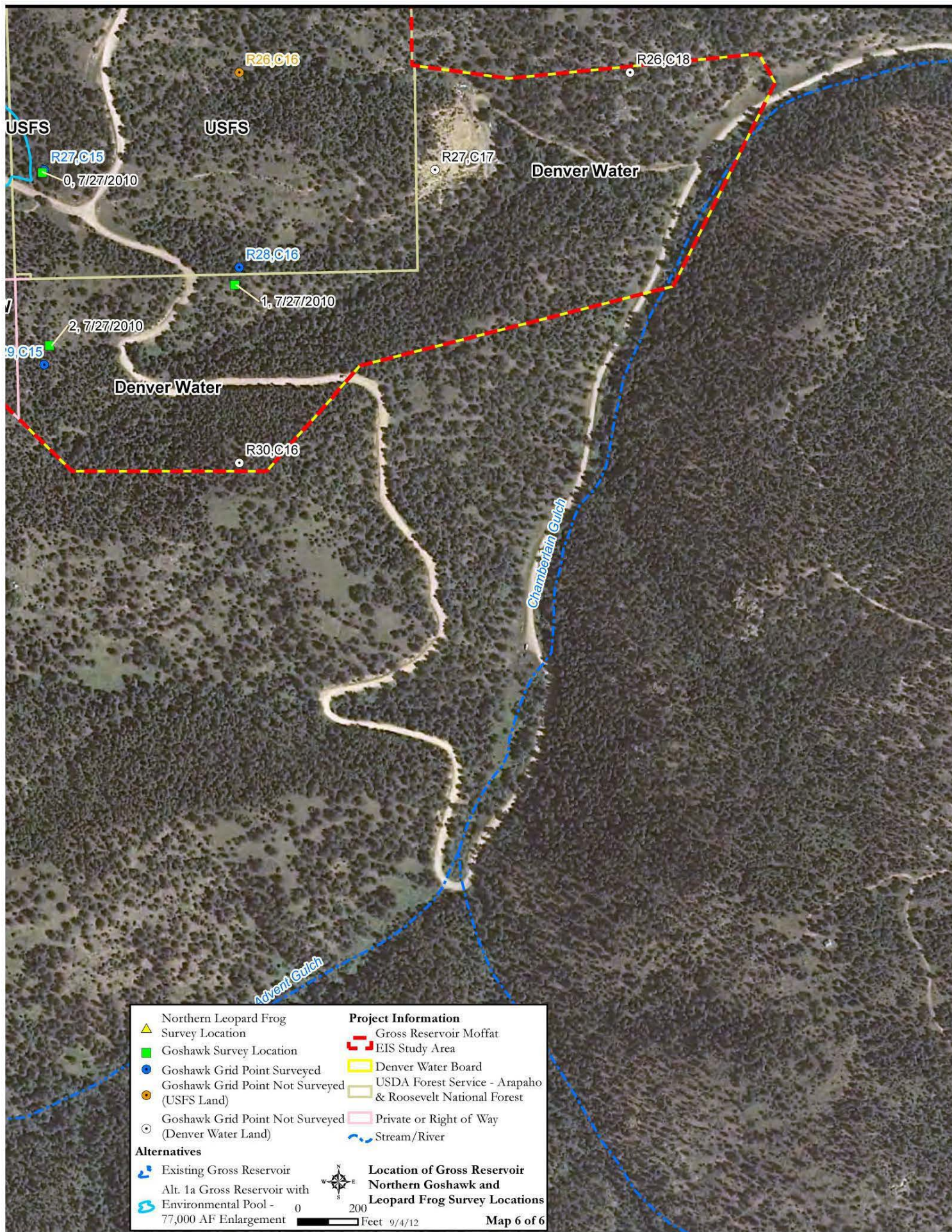












Appendix B

Photographs



Photo 1, Typical open canopy, sparsely treed ponderosa pine woodland near Lakeshore Drive residential area.



Photo 2, Above the north shore of Gross Reservoir, viewing dense canopy forest on north-facing slope of Winiger Ridge, which is a medium to high priority survey area.

Appendix B

Photographs



Photo 3, Open canopy ponderosa pine association above the north shore of Gross Reservoir. A representative low priority call station.



Photo 4, Background of photo illustrates dense mixed-conifer forest on north-facing slope on Winiger Ridge, a representative medium or high priority survey area for the northern goshawk.



Photo 5, Open canopy ponderosa pine forest, with closely spaced trees near goshawk call station R27C11, a high priority station.



Photo 6, Ponderosa pine forest with relatively open canopy, clear understory, and mid-aged trees. A low or medium priority goshawk call station.

Appendix B

Photographs



Photo 7, Ponderosa pine forest with open canopy near prescribed burn on Winiger Ridge. A representative low priority goshawk call station.



Photo 8, Douglas fir forest with a dense canopy and downed wood on Winiger Ridge (near call station R8C10). A potential foraging area for the northern goshawk. A high priority call station.



Photo 9, A north-facing slope with a Douglas fir ponderosa pine association, downed wood, a moderate canopy cover, and moderate understory. A potential foraging area for the northern goshawk. A medium or high priority call station.



Photo 10, Representative habitat along South Boulder Creek assessed for the Northern Leopard Frog.

Appendix B

Photographs



Photo 11, Shoreline riparian or wetland habitat assessed for the northern leopard frog on the north shore of Gross Reservoir.



Photo 12, Riparian vegetation assessed for the northern leopard frog in Middle Tributary on south side of reservoir.



Photo 13, Riparian vegetation assessed for the northern leopard frog in Middle Tributary. Typical of unnamed drainages on south shore of Gross Reservoir.



Photo 14, Inlet of Winiger Gulch assessed for northern leopard frog habitat.

Appendix B

Photographs



Photo 15, Grassy opening along Winiger Gulch assessed for northern leopard frog habitat.

Appendix C
Northern Goshawk Survey Results By Call Station

Appendix C

Northern Goshawk Survey Results By Call Station

Map Sheet Number	Call Station Number	ID-Date	Land Status	Priority*	Response	Comments
First Round of Surveys						
2	R3, C19	0-7/22/2010	USFS	Low	None	
2	R3, C17	1-7/22/2010	USFS	Low	None	
2	R3, C15	2-7/22/2010	Private	(Low)	None	Offset to be on USFS land
2	R3, C13	3-7/22/2010	USFS	Medium	None	
1	R1, C11	5-7/22/2010	USFS	(Low)	None	
1	R2, C10	6-7/22/2010	USFS	Medium	None	Offset due to poor satellite reception and cliff
1	R2, C8	7-7/22/2010	USFS	High	None	
1	R3, C7	8-7/22/2010	USFS	High	None	
1	R4, C6	9-7/22/2010	USFS	High	None	
1	R5, C7	10-7/22/2010	USFS	High	None	
1	R6, C8	11-7/22/2010	USFS	(High)	None	
1	R5, C9	12-7/22/2010	USFS	High	None	
1	R4, C8	13-7/22/2010	USFS	High	None	
1	R4, C10	14-7/22/2010	USFS	Medium	None	
1	R3, C11	15-7/22/2010	USFS	High	None	
1	R3, C9	16-7/22/2010	USFS	High	None	
2	R4, C18	0-7/23/2010	Denver Water	(Low)	None	

Appendix C

Northern Goshawk Survey Results By Call Station

Map Sheet Number	Call Station Number	ID-Date	Land Status	Priority*	Response	Comments
2	R5, C17	1-7/23/2010	Denver Water	(Low)	None	
2	R4, C16	2-7/23/2010	Denver Water	(Low)	None	Offset due to cliff
2	R5, C15	3-7/23/2010	Denver Water	(Low)	None	
2	R4, C14	4-7/23/2010	Denver Water	(Low)	None	
1	R4, C12	5-7/23/2010	USFS	Medium	None	
1	R5, C11	7-7/23-2010	USFS	Medium	None	
6	R27, C13	9-7/23/2010	Denver Water	(Medium)	None	
6	R26, C12	10-7/23/2010	USFS	High	None	
6	R27, C11	11-7/23/2010	USFS	High	None	Offset to be in dense forest
6	R29, C11	13-7/23/2010	Denver Water	(High)	None	
6	R28, C12	14-7/23/2010	USFS	High	None	
6	R27, C15	0-7/27/2010	USFS	High	None	
6	R28, C16	1-7/27/2010	USFS	High	None	
6	R29, C15	2-7/27/2010	Denver Water	(High)	None	
4	R24, C16	3-7/27/2010	USFS	Medium	None	Offset due to poor satellite reception
4	R22, C16	4-7/27/2010	USFS	Medium	None	Offset due to poor satellite reception
4	R21, C15	5-7/27/2010	USFS	High	None	
4	R23, C15	6-7/27/2010	USFS	Medium	None	

Appendix C

Northern Goshawk Survey Results By Call Station

Map Sheet Number	Call Station Number	ID-Date	Land Status	Priority*	Response	Comments
1	R7, C9	0-7/28/2010	USFS	High	None	
1	R8, C10	1-7/28/2010	USFS	High	None	
1	R7, C11	2-7/28/2010	USFS	High	None	
1	R8, C12	3-7/28/2010	USFS	Medium	None	
2	R9, C13	4-7/28/2010	Denver Water	(Medium)	None	
3	R14, C10	5-7/28/2010	USFS	Medium	None	
3	R16, C10	6-7/28/2010	USFS	High	None	
3	R17, C11	7-7/28/2010	USFS	High	None	
3	R19, C11	8-7/28/2010	USFS	High	Goshawk	Silent Visual, flew from NE, circled, flew to NW
3	R18, C10	9-7/28/2010	USFS	High	None	
3	R17, C9	10-7/28/2010	USFS	High	None	
3	R16, C8	11-7/28/2010	USFS	High	None	
3	R17, C7	12-7/28/2010	USFS	Medium	None	
3	R16, C6	13-7/28/2010	USFS	High	None	
3	R15, C5	14 – 7/28/2010	USFS	Medium	None	
3	R14, C4	15-7/28/2010	USFS	High	None	
4	R20, C16	0-7/29/2010	Denver Water	(Medium)	None	
5	R26, C6	1-7/29/2010	USFS	High	None	

Appendix C

Northern Goshawk Survey Results By Call Station

Map Sheet Number	Call Station Number	ID-Date	Land Status	Priority*	Response	Comments
5	R27, C5	2-7/29/2010	USFS	High	None	
5	R27, C7	3-7/29/2010	USFS	High	None	
3	R25, C7	4-7/29/2010	USFS	High	None	
3	R23, C7	5-7/29/2010	USFS	High	None	
3	R24, C8	6-7/29/2010	USFS	High	None	
5	R26, C8	7-7/29/2010	USFS	High	None	
5	R28, C8	8-7/29/2010	USFS	High	None	
5	R27, C9	9-7/29/2010	USFS	High	None	Offset to be in dense forest
6	R27, C10	10-7/29/2010	USFS	High	None	Offset to be in dense forest
4	R16, C18	0-7/30/2010	Denver Water	(Medium)	None	Offset due to fence and steep terrain
4	R18, C16	1-7/30/2010	Denver Water	(High)	None	Offset due to terrain
5	R26, C4	2-7/30/2010	USFS	Medium	None	
3	R25, C3	3-7/30/2010	USFS	High	None	
5	R26, C2	4-7/30/2010	USFS	Medium	None	
3	R24, C6	5-7/30-2010	USFS	Medium	None	
3	R23, C5	6-7/30/2010	USFS	Medium	None	
3	R21, C5	7-7/30-2010	USFS	Medium	None	
3	R20, C6	8-7/30/2010	USFS	Medium	None	

Appendix C

Northern Goshawk Survey Results By Call Station

Map Sheet Number	Call Station Number	ID-Date	Land Status	Priority*	Response	Comments
3	R19, C7	9-7/30-2010	USFS	Medium	None	
3	R20, C8	10-7/30/2010	USFS	Medium	None	
3	R23, C10	12-7/30/2010	USFS	Medium	None	Surveyed at shoreline on 7/30
3	R21, C11	13-7/30/2010	USFS	High	None	
4	R17, C13	14-7/30/2010	USFS	High	None	
4	R18, C14	15-7/30/2010	Denver Water	(High)	None	Offset due to terrain
4	R19, C15	16-7/30/2010	Denver Water	(High)	None	Offset due to terrain
4	R20, C14	17-7/30/2010	Denver Water	(High)	None	
4	R21, C13	18-7/30/2010	USFS	High	None	Offset due to terrain
4	R23, C13	19-7/30/2010	USFS	Medium	None	
4	R22, C14	20-7/30/2010	USFS	Medium	None	
Second Round of Surveys						
3	R14, C10	0-8/10/2010	USFS	Medium	None	
3	R15, C9	1-8/10/2010	USFS	(Medium)	None	Not surveyed first round
3	R16, C8	2-8/10/2010	USFS	High	None	
3	R17, C9	3-8/10,2010	USFS	High	None	
3	R16, C10	4-8/10/2010	USFS	High	None	
3	R17, C11	5-8/10/2010	USFS	High	None	

Appendix C

Northern Goshawk Survey Results By Call Station

Map Sheet Number	Call Station Number	ID-Date	Land Status	Priority*	Response	Comments
3	R19, C11	6-8/10/2010	USFS	High	None	
3	R18, C10	7-8/10/2010	USFS	High	None	
3	R19, C9	8-8/10/2010	USFS	Medium	None	Not surveyed first round
3	R20, C10	9-8/10/2010	USFS	Medium	None	Not surveyed first round
3	R23, C10	11-8//2010	USFS	Medium	None	
3	R21, C9	12-8/10/2010	USFS	Medium	None	Not surveyed first round

Notes: *Parentheses indicate priority levels that were set in the field or after survey.

Attachment C
Survey for Rare and Sensitive Plant Species at Gross Reservoir,
July-August 2010

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This technical report has been prepared as part of National Environmental Policy Act of 1969 (NEPA) compliance for the Moffat Collection System Project (Moffat Project). The U.S. Army Corps of Engineers (Corps) published a Draft Environmental Impact Statement (DEIS) in October to analyze the direct, indirect, and cumulative effects of this water supply project. This technical report is included as Appendix G-3 in the Final EIS (FEIS). The Project proponent is the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water). The Corps, Omaha District, Regulatory Branch is the lead federal agency responsible for preparing the EIS. Two other federal agencies with statutory authority over the proposed Project are participating in the NEPA process as cooperating agencies, the U.S. Environmental Protection Agency (EPA), and Federal Energy Regulatory Commission (FERC). The U.S. Forest Service (USFS) declined to be a cooperating agency.

USFS comments on the Draft EIS requested surveys for sensitive and locally rare plants at Gross Reservoir. In response to the request for surveys, the Corps' contractor coordinated with the USFS botanist Steve Popovich and conducted surveys in the summer of 2010. This report includes the results of surveys conducted for targeted rare plant species, including USFS Region 2 sensitive species and plant species of local concern to the USFS, Arapaho-Roosevelt National Forest (ARNF). Maps of the target species locations are included in Appendix A. A list of all plant species observed during surveys is provided in Appendix B. Photographs of target species and vegetation communities are included in Appendix C.

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The study area for the rare plant survey was established to cover the maximum area that could be disturbed by construction and operation of the expanded reservoir. The five action alternatives evaluated in the EIS represent four reservoir sizes (Table 1). The study area included areas occupied by the expanded dam and reservoir, areas of temporary disturbance during construction, areas of tree clearing along the new shoreline, and an additional 50-foot horizontal buffer. The contour lines on the maps in Appendix A represent the areas that would be affected by inundation and tree clearing along the edge of the expanded reservoir. The inundation line would be lower in elevation than the contours included on the map. To ensure the survey area was geographically broad enough, the study area was extended up several of the drainages to look at sites where target species had previously been found, and/or to look for additional locations of some of the species that would be affected by expansion of the reservoir.

Table 1
Gross Reservoir Alternatives

Alternative	Proposed Full Pool Elevation with the Environmental Pool for Mitigation (AF)	Elevation of Inundation (feet)	Maximum Elevation of Tree Clearing Along Shoreline
Proposed Action (1a)	77,000	7,406	7,410
1c	40,700	7,357	7,367
8a/10a	52,000	7,374	7,384
13a	60,000	7,385	7,395

The list of target plant species was provided by the USFS botanist Steve Popovich (Table 2). Based on the season and species involved, Steve Popovich recommended that some species should be surveyed by experts in those species. Specifically, he recommended that Scott Smith survey for orchids and ferns, and that Diane Culver of the Colorado Natural Heritage Program (CNHP) survey for certain sedges, dwarf raspberry, *Sphagnum*, and other species, and for plant communities of local concern. Scott Smith conducted the surveys for orchids and ferns and his results are provided in a separate report. The maps in Appendix A of this report include a couple of fern locations he recorded. URS attempted to have Denise Culver conduct the planned surveys, but she developed a scheduling conflict during the field season. URS biologists therefore addressed the species that she would have surveyed. Table 2 provides the list of target species and the recommended and actual surveyor for each species.

Previous survey information was obtained and reviewed. Surveys conducted for the DEIS in 2005 and 2006 included preparation of a vegetation map and description of vegetation types at Gross Reservoir, and delineation of wetlands and riparian areas. The results of these surveys were provided in the DEIS. A previous rare plant survey of the Gross Reservoir area was conducted by Rick Brune in 2001 for Denver Water's Recreation Management Plan and power line relocation associated with the FERC relicensing (Shapins Associates 2002). The 2001 survey did not include all areas of anticipated disturbance for the proposed reservoir enlargement, and partially extended outside of the Gross Reservoir study area along Forsythe Canyon. These surveys were conducted in June, July, and August

2001. GPS data was obtained for these rare plant locations. Rick Brune conducted a second survey in the area north of the dam in 2003 but did not find any special status plant species (Brune 2003). CNHP found Sprengel's sedge, near Gross Reservoir in 2007 (CNHP 2009) and the GPS location was obtained from USFS. GIS data for existing and developing old growth was provided by Bev Baker with the USFS. CNHP descriptions of potential conservation areas (PCAs) in the study area (CNHP 2009) and of wetland and riparian plant associations (CNHP 2003) was obtained and reviewed.

Field maps and study area boundaries were created using 1:200 foot aerial photographs. Previously collected shapefiles for wetlands and riparian areas were included on the field maps, along with previous locations of target species and land ownership. Data was collected on target species and plant communities to develop search images and to understand habitat requirements.

The surveys were conducted by the Corps' consultants Susan Hall, Amber Ballman, and Jeff Dawson of URS. Information on their qualifications was provided to USFS prior to the survey. The survey covered the entire study area, with special emphasis on the six drainages that would be affected, including Forsythe Canyon, Winiger Gulch, South Boulder Creek above the existing reservoir, and the three unnamed tributaries on the south side of the existing reservoir. Although the purpose of the survey was to address USFS issues, the survey included all areas of potential effect without regard to landowner. Surveys covered the following areas:

- July 19, 2010. Northeast shore of Gross Reservoir. Susan Hall and Amber Ballman.
- July 20, 2010. North shore of Gross Reservoir. Susan Hall and Amber Ballman
- July 21, 2010. Forsythe Canyon and west shore of reservoir. Susan Hall and Amber Ballman
- July 23, 2010. South side of reservoir, west and middle unnamed tributaries. Susan Hall
- July 25, 2010. South side of South Boulder Creek, middle tributary, east shore of reservoir. Susan Hall
- August 4, 2010. Winiger Gulch. Susan Hall and Jeff Dawson
- August 17, 2010. Forsythe Canyon. Susan Hall and Jeff Dawson
- August 18, 2010. North side of South Boulder Creek, Winiger Gulch, East tributary. Susan Hall and Jeff Dawson.

In the field, the survey was conducted using zig-zag pedestrian survey during which general vegetative communities were identified and individual species within each community were recorded. Potential target species habitats, riparian areas, creeks, areas with a predominance of deciduous trees and shrubs, and plant communities of concern were given priority. Weber and Wittman (2003). Shaw (2008), Carter (2006), Johnston (2001), Hurd et al (1998), and Dorn (1997) and other references relevant to the region were used for species identification. In addition, photographs of the target species were downloaded from the Internet and were used as a reference in the field.

When target species were observed, positive identification was obtained using Weber and Wittmann (2003) and other references. The number of plants within each population was counted. Where a large number of plants occurred or plants were scattered throughout the undergrowth, population size was estimated. *Carex sprengelii* plants were often not distinct and the count represents an approximate number of clumps. The locations of identified species were mapped using a sub-meter handheld Global Positioning System (GPS) unit. Where a GPS datapoint could not be taken (within steep, narrow canyons or areas of dense overstory), the location of the surveyors was verified with the GPS unit. The population, including number of individuals, was then manually recorded on the field maps. Photographs were taken of each population observed and the habitat where it was observed. Where URS found a species near a previously reported occurrence, it was assumed that they represented the same location and that the differences in GPS location were due to inaccuracies in the older GPS data.

After completion of surveys, GPS data was uploaded and corrected in GIS and incorporated into a map figure set. Any hand mapped populations were manually digitized. The map set was verified against field notes.

Analysis of impacts is provided in the USFS Technical Report (Biological Evaluation), to which this survey report is appended.

Table 2
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Region 2 USFS Sensitive Species for the ARNF Potentially present at Gross Reservoir					
Park milkvetch	<i>Astragalus leptaleus</i>	Low	Season is already too late for standard identification (Popovich 7/11/2010)	CNHP	Scott Smith
Upswept moonwort	<i>Botrychium ascendens</i>	Low		Scott Smith	Scott Smith
Fork-leaved moonwort	<i>Botrychium "furcatum"</i>	Low		Scott Smith	Scott Smith
Slender moonwort	<i>Botrychium lineare</i>	Medium		Scott Smith	Scott Smith
Paradox moonwort	<i>Botrychium paradoxum</i>	Low		Scott Smith	Scott Smith
Lesser panicled sedge	<i>Carex diandra</i>	Low		CNHP	Scott Smith, Corps
Livid sedge	<i>Carex livida</i>	Low		CNHP	Corps
Yellow lady's slipper	<i>Cypripedium calceolus</i> spp. <i>parviflorum</i>	Medium to High		Scott Smith	Scott Smith
Stream orchid	<i>Epipactis gigantea</i>	Low to medium		Scott Smith	Scott Smith
Colorado tansy-aster	<i>Macheeranthera coloradensis</i>	Low		CNHP, Corps	Scott Smith, Corps
Adder's mouth	<i>Malaxis brachypoda</i>	Medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Budding monkeyflower	<i>Mimulus gemmiparus</i>	Low	Included in Brune search list in 2002, not found	Corps	Scott Smith, Corps
Rocky Mountain cinquefoil	<i>Potentilla rupicola</i>	Low to medium	Season is already too late for standard identification (Popovich 2010)	CNHP	Scott Smith

Table 2 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Greenland primrose	<i>Primula egalikensis</i>	Low		CNHP	Corps
Dwarf raspberry	<i>Rubus arcticus</i> ssp. <i>acaulis</i> (<i>Cylactis arctica</i> ssp. <i>acaulis</i>)	Known to occur in study area	Found by Rick Brune upstream of study area	CNHP	Scott Smith, Corps
Silver willow	<i>Salix candida</i>	Low		Corps	Corps
Autumn willow	<i>Salix serissima</i>	Low	Included in Brune search list in 2002, not found	Corps	Scott Smith, Corps
Sphagnum (peat moss)	<i>Sphagnum angustifolium</i>	Low		CNHP	Scott Smith Corps
Baltic sphagnum	<i>Sphagnum balticum</i>	Low		CNHP	Scott Smith, Corps
Lesser bladderwort	<i>Utricularia minor</i>	Low	Only one site known on forest	Corps	Scott Smith, Corps
Selkirk's violet	<i>Viola selkirkii</i>	Medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Plant Species of Local Concern for the ARNF					
Ferns, all except <i>Cystopteris fragilis</i>	Various	High		Scott Smith	Scott Smith
Larimer aletes	<i>Aletes humilis</i>	Low		Corps	Corps
Wild sarsaparilla	<i>Aralis nudicaulis</i>	Known in study area	Rick Brune found 6 sites	Corps	Corps
Paper birch	<i>Betula papyrifera</i>	Low		CNHP/Corps	Corps
Triangle-leaved moonwort, green-stemmed phase	<i>Botrychium lanceolatum</i> ssp. "viride"	Low		Scott Smith	Scott Smith

Table 2 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Leather leaf grapefern	<i>Botrychium multifidum</i>	Low to medium		Scott Smith	Scott Smith
Northwestern moonwort	<i>Botrychium pinnatum</i>	Low		Scott Smith	Scott Smith
“Redbank” moonwort	<i>Botrychium</i> “redbank”	Low		Scott Smith	Scott Smith
Least moonwort	<i>Botrychium simplex</i>	Low to medium		Scott Smith	Scott Smith
Rattlesnake fern	<i>Botrypus virginianus</i>	Low to medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Dewey sedge	<i>Carex deweyana</i>	Known in study area	Rick Brune reported two sites in study area	CNHP	Corps
Woodyfruit sedge	<i>Carex lasiocarpa</i>	Low		Corps	Corps
Mud sedge	<i>Carex limosa</i>	Low		Corps	Corps
Peck’s sedge	<i>Carex peckii</i>	Low	Was included in Brune search list, not found	CNHP	Corps
Sprengel’s sedge	<i>Carex sprengelii</i>	Known in study area	Reported by CNHP.	CNHP	Corps
Enchantress’s nightshade	<i>Circaea alpina</i>	Known in study area		Corps	Corps
Purple cinquefoil	<i>Comarum palustre</i>	Medium to High		Corps	Corps
Yellow coralroot	<i>Corallorhiza trifida</i>	Medium		Scott Smith	Scott Smith, Corps
Spring coralroot	<i>Corallorhiza wisteriana</i>	Medium		Scott Smith	Scott Smith, Corps
Bunchberry	<i>Cornus canadensis</i>	Low		Corps	Corps
Hazelnut	<i>Corylus cornuta</i>	Medium		Corps	Corps

Table 2 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Rattlesnake-plantain	<i>Goodyera repens</i>	Medium	Included in Brune search list, not found	Scott Smith/ Corps	Scott Smith
Tall blue lettuce	<i>Lactuca biennis</i>	Known in study area	One occurrence found by Rick Brune upstream on Forsythe Gulch	Corps, CNHP	Corps
Rocky Mountain blazing star	<i>Liatris ligulistylis</i>	Low	Included in Brune search list, not found	Corps, CNHP	Corps
Wood lily	<i>Lilium philadelphicum</i>	Low to medium	Included in Brune search list, not found	Scott Smith	Scott Smith
Northern twayblade	<i>Listera borealis</i>	Low		Scott Smith	Scott Smith
Broadlipped twayblade	<i>Listera convallarioides</i>	Low	Included in Brune search list, not found	Scott Smith	Scott Smith
Heartleaved twayblade	<i>Listera cordata</i>	High		Scott Smith	Scott Smith
Utah lupine	<i>Lupinus lepidus</i> var. <i>utahensis</i>	Low		Corps	Corps
Stiff club-moss	<i>Lycopodium annotinum</i>	Low		All	Corps
Fringed loosestrife	<i>Lysimachia ciliata</i>	Medium to high		CNHP, Corps	Corps
Leechleaf blazingstar	<i>Mentzelia sinuata</i>	Low		CNHP, Corps	Corps
Buckbean	<i>Menyanthes trifoliata</i>	Low		Corps	Corps
Sweet coltsfoot	<i>Petasites saggitatus</i>	Low		Corps	Corps
Silvery primrose	<i>Primula incana</i>	Low		Corps	Corps
Pictureleaf wintergreen	<i>Pyrola picta</i>	Low to medium	Included in Brune search list, not found	Scott Smith, Corps	Corps

Table 2 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Maryland sanicle	<i>Sanicula marilandica</i>	Known in study area	One site reported by Rick Brune	CNHP	Corps
False melic	<i>Schizachne purpurascens</i>	Known in study area	One site reported by Rick Brune upstream on Forsythe Gulch	CNHP, Corps	Corps
All other sphagnum species not included as sensitive	<i>Sphagnum</i> spp.	Low		Corps	Corps
Plant Communities of Local Concern for the ARNF					
Colorado blue spruce	<i>Picea pungens</i>	Known in study area		CNHP	Corps
Ponderosa pine/spike fescue	<i>Pinus ponderosa</i> <i>Leucopoa kingii</i>	Medium to high	Included in Brune search list, not found	CNHP	Corps
Ponderosa pine/ antelope bitterbrush	<i>Pinus ponderosa</i> / <i>Purshia tridentata</i>	Medium to high		CNHP	Corps
Relictual prairie grass riverine community	<i>Spartina pectinata</i> – <i>Sorghastrum avenaceum</i> – <i>Andropogon gerardii</i> – <i>Dicahanthelium oligosanthes</i> – <i>Hypericum majus</i>	Medium		CNHP	Corps
Ponderosa pine old growth	<i>Pinus ponderosa</i>	Known in study area	A portion of study area was mapped as ponderosa old growth by USFS in work for 1997 Forest Plan	CNHP	Corps
Upwelling/ dome springs/ seeps		Low		CNHP	Corps

Table 2 (cont.)
Target List of Special Status Plant Species for 2010 Surveys at Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence at Gross Reservoir (USFS EIS Comments)	Notes	Recommended surveyor (from Steve Popovich, USFS, 7/11/2010)	Actual Surveyor
Thinleaf alder/ mesic forb riparian shrubland	<i>Alnus incana/ mesic forbs shrubland</i>	Known in study area		CNHP	Corps
Foothills riparian shrubland	<i>Betula occidentalis/ Maianthemum stellatum</i> or other forbs	Known in study area	According to Brune report “apparently grows in much of Forsythe Canyon, possibly mixed with other riparian plant associations”	CNHP	Corps
Fens	Habitat for a number of USFS Sensitive and local concern plant species	Known in study area (Williams Fork River Valley)		Corps, CNHP (Gross) Corps (Williams Fork River Valley)	Corps

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3.1 DESCRIPTION OF THE STUDY AREA

Gross Reservoir is located on the eastern slope of the Front Range of the Southern Rocky Mountains, approximately 5 miles west of the eastern edge of the Rocky Mountain uplift. The reservoir can be found on the Tungsten and Eldorado Springs U.S. Geological Survey 7.5 minute quadrangle maps at Township 1 South, Range 71 West, Sections 19, 20, 21, 29, and 30. The centerpoint coordinates of the reservoir are located at approximately Latitude 39.9452 Longitude -105.3656. The dam and the eastern portion of the reservoir are on Denver Water land, while the western parts are on federal lands managed by ARNF.

The reservoir is located within the Crystalline Mid-Elevation Forests ecoregion of Colorado, a partially glaciated region of low mountain ridges, slopes, and outwash fans (Chapman et al. 2006). Elevations in the vicinity range from about 6,900 feet below the dam to approximately 8,100 feet on nearby peaks. Elevations within the survey area ranged from about 7,280 at the existing shoreline to about 7,450 feet.

The reservoir is located within the South Boulder Creek watershed in Boulder County, Colorado. In addition to South Boulder Creek which supplies the primary reservoir inflow, there are five tributaries on west and south sides of the reservoir. The two tributaries on the west side are named and include Forsythe and Winiger Creek. Each of these drainages includes a side drainage that was included the study area. Three smaller unnamed creeks flow into the reservoir along the south side and were identified as the east, middle and west tributaries.

Within and near the study area, vertical cliffs of up to a few hundred feet high occur in some locations. Ridges between the ravines and higher areas are more gently sloped with some relatively small flat areas. Stream valley bottoms are steep, narrow, and filled with boulders and downfall. The geology and different aspects of the area surrounding the reservoir contribute greatly to community composition. Soils within the upland areas tend to be shallow and rocky and are often punctuated with large granite outcroppings. Areas supporting the most vegetative diversity are located in ravines or gulches. The existing reservoir is subject to large fluctuations in water level, which results in exposure of large areas of unvegetated slopes. Small areas of emergent wetlands area located at some locations along the existing shoreline.

Vegetation

A total of 7 general vegetation communities were observed to occur around the reservoir. Vegetation communities include mixed conifer forest, open ponderosa pine forest, mid-seral aspen forest, rock outcrops and talus slopes, montane grassland, riparian and wetland, and disturbed areas. The following descriptions are primarily taken from Chapter 3 of the DEIS, combined with field observations in 2010. The specific composition of each vegetative community transitions frequently with changes in aspect and slope around the reservoir.

Mixed conifer forest

The ponderosa pine (*Pinus ponderosa*)/Douglas fir (*Pseudotsuga menziesii*) communities have dense canopies of mixed conifer trees which have suppressed understory production. These communities are typically found growing on moderately moist slopes that have northern or western aspects. Tree canopy cover is greater than 30% with the average basal area at 65 square feet/acre. Ponderosa pine and Douglas fir are the dominant trees and occur in nearly equal proportions. Some Rocky Mountain juniper and Rocky Mountain maple (*Acer glabrum*) trees are also present in the canopy. Common shrub species include wax currant, chokecherry (*Prunus virginiana*), kinnikinnik (*Arctostaphylos uva-ursi*), and common juniper (*Juniperus communis*). Dominant forb species include white sagebrush (*Artemisia ludoviciana*), hairy false golden aster (*Heterotheca villosa*), fringed sage (*Artemisia frigida*), and bigflower cinquefoil (*Potentilla fissa*). Dominant grass and sedge species include sedge (*Carex* sp.), Colorado wildrye (*Leymus ambiguus*), squirreltail (*Elymus elymoides*), and Porter's brome (*Bromus porteri*). Noxious weed species do not make a significant contribution to the relative cover. Weed species found within the ponderosa pine/Douglas-fir mix community include common mullein (*Verbascum thapsus*), cheatgrass (*Bromus tectorum*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), and houndstongue (*Cynoglossum officinale*).

Open Ponderosa Pine Forest

Open ponderosa pine forests are typically found on xeric slopes that have southern, eastern, or western aspects. Ponderosa pine is the dominant tree but Douglas-fir and Rocky Mountain juniper (*Juniperus scopulorum*) trees also occur. Open ponderosa pine forests typically contain an understory of xeric montane grasses and forbs. Based on field observations, these areas have a 10 to 30% tree canopy cover and an average basal area of 53 square feet/acre. These areas are typically found on dry (xeric) slopes that have southern, eastern or western aspects. Shrubs are common in the understory. Dominant shrub species include wax currant (*Ribes cereum*), Fendler's ceanothus (*Ceanothus fendleri*), skunkbrush sumac (*Rhus trilobata*), Woods' rose (*Rosa woodsii*), common juniper, and soapweed yucca (*Yucca glauca*). Forbs make the largest contribution to understory cover. Dominant forb species include fringed sage, white sagebrush, hairy false golden aster, sulphur buckwheat (*Eriogonum umbellatum*), and geranium (*Geranium* spp.). Grasses and sedges are slightly less abundant in the understory. Dominant grass and sedge species include mountain muhly (*Muhlenbergia montana*), Colorado wildrye (*Leymus ambiguus*), blue grama (*Bouteloua gracilis*), prairie Junegrass (*Koeleria macrantha*), cheatgrass, and sedge. Noxious weed species do not make a significant contribution to the relative cover in the ponderosa pine communities. Weed species found within this community include common mullein, cheatgrass, Canada thistle, and houndstongue.

Mid-Seral Aspen Forest

This vegetation community was not identified during the 2006 vegetation study. The mid-seral aspen community was only found in small areas in two dry gulches along the eastern side of the reservoir on Denver Water land. This community includes aspen-dominated stands with a relatively closed canopy of trees 16 to 66 feet tall. Ponderosa pine and other

conifers may be present but are never co-dominant. Understory vegetation is primarily herbaceous and mesic. Common species include roundleaf snowberry (*Symphoricarpos rotundifolius*), common snowberry (*Symphoricarpos albus*), chokecherry, Wood's rose, wild plum, and ponderosa pine.

Rock Outcrops and Talus Slopes

Comprised mostly of large solid or fragmented rocks, these areas occur throughout the study area at all elevations. Along the north side of the study area, rock outcrops generally occur within mixed conifer forest approximately 200 feet upslope of the reservoir. Within canyons or drainages, outcrops flank narrow riparian corridors. Rock outcrop communities contain less than 15 percent vascular vegetation and are comprised primarily of species with the ability to colonize depressions or cracks within the rocks.

Montane Grassland

Montane grassland was identified as grass/forb mix community in the EIS. It occurs along the eastern side of the reservoir and in small patches elsewhere in the study area. Montane grassland is comprised of a mix of xeric montane species. Patches of this community frequently intermingle with the open ponderosa pine community. The boundaries between these communities are obscured by a high degree of vegetative similarity; the primary difference being the presence of a forested overstory in the ponderosa pine community. Shrubs, forbs and grasses are all common. Clumps of wax currant and Fendler's ceanothus intermingle with forbs and grasses. Common forb species include hairy false golden aster, fringed sage, sulphur buckwheat and common yarrow (*Achillea millefolium*). Common grass species include Colorado wildrye (*Leymus ambiguus*), cheatgrass, Porter's brome and mountain muhly. Common noxious weed species in the rangeland areas at Gross Reservoir include common mullein, cheatgrass, and musk thistle.

The burned area on the on the western side of Gross Reservoir study area (identified as disturbed rangeland in the EIS) is an area where a prescribed burn was conducted several years ago in a ponderosa pine community and a grass/forb community. Native plants such as fringed sage, hairy false golden aster, white sagebrush, geranium, Colorado wildrye, mountain muhly, bluebunch wheatgrass (*Pseudoroegneria spicata*), and sedge are common, but invasive species such as cheatgrass, common mullein, and musk thistle make a significant contribution to the relative cover in some locations. Additional disturbance to these areas include off-highway vehicle (OHV) use, recreational trails, litter, and erosion.

Riparian and Wetland

Riparian areas include forested, shrub, and herbaceous area along the shoreline of Gross Reservoir and in surrounding drainages. Riparian communities include areas that are considered to be wetlands under the jurisdiction of the Corps under Section 404 of the Clean Water Act (CWA), as well as other areas of moist woodlands or shrub communities adjacent to creeks, wetlands, and the reservoir shoreline.

Riparian vegetation occurs along Winiger and Forsythe gulches on the west side of the reservoir, along three unnamed tributaries on the south side of the reservoir, and along some

portions of South Boulder Creek above and below the reservoir. Riparian woodlands associated with drainages are commonly dominated by narrowleaf cottonwood (*Populus angustifolia*), very tall thinleaf alder (*Alnus incana*), and water birch (*Betula occidentalis*). Several conifer species are also present, including Douglas-fir, lodgepole pine, blue spruce (*Picea pungens*), and Engelmann spruce (*Picea engelmanni*). Wet riparian shrublands are dominated by thinleaf alder, waterbirch, Missouri River willow (*Salix eriocephala*), sandbar willow, and park willow (*Salix monticola*). Moist riparian shrublands along drainages are diverse, with a mix of various willows, serviceberry (*Amelanchier alnifolia*), water birch, redosier dogwood (*Cornus sericea*), cliffbush (*Jamesia americana*), ninebark (*Physocarpus monogyrus*), chokecherry, various gooseberries (*Ribes* spp.), Woods' rose, and roundleaf snowberry along with patches of dense herbaceous vegetation. Emergent wetlands associated with the drainages are commonly dominated by giant angelica (*Angelica ampla*), common spikerush (*Eleocharis palustris*), field horsetail (*Equisetum arvense*), fowl mannagrass, and American speedwell (*Veronica americana*).

The reservoir shoreline includes small, scattered patches of riparian woodland, shrubland, and emergent wetlands. Shoreline woodlands are comprised of widely spaced plains cottonwood (*Populus deltoides*) and narrowleaf cottonwood, with pockets of thinleaf alder. Shoreline riparian shrub mostly consists of very small pockets of sandbar willow (*Salix exigua*). Reservoir shoreline emergent wetlands are dominated by creeping bentgrass (*Agrostis stolonifera*), woolly sedge (*Carex pellita*), fowl mannagrass (*Glyceria striata*), reed canarygrass (*Phalaris arundinacea*), and panicked bulrush (*Scirpus microcarpus*).

Disturbed Soil

Disturbed soil includes areas where human activities, such as excavation and disposal sites, have created bare ground with resultant vegetative cover less than 10%. Forbs make the largest contribution to the relative cover in disturbed areas. This community type is found west of the dam and east of the boat launch, where construction activities and recreation have impacted the vegetation, resulting in barren areas. Small areas of disturbed soil also occur within the montane grassland community on the western portion of the Gross Reservoir study area (Winiger Gulch) as a result of OHV use and erosion. Forbs make the largest contribution to the relative cover in disturbed areas. Dominant forb species include yellow sweetclover (*Melilotus officinalis*), hairy false goldenaster, field sagewort (*Artemisia campestris*), white sagebrush, and fringed sage. Grasses make a minor contribution to the relative cover in disturbed areas. Common grass species include Canada bluegrass (*Poa compressa*), fescue (*Festuca* spp.), cheatgrass, and Porter's brome. Noxious weed species associated with disturbed soil include cheatgrass and common mullein.

3.2 TARGETED RARE PLANT SPECIES

URS conducted surveys for 38 target plant species (Table 3). The other species identified as target species by USFS are addressed in the report by Smith (2010). URS found 7 of the target species, shown in bold in Table 3. Smith (2010) did not find any of the target species with the exception of ferns.

Table 3
Results of URS Rare Plant Survey

Common Name	Scientific Name	Status	Habitat	Suitable Habitat Present?	Observed in 2010 Survey?	Map Numbers (Appendix A)
Larimer aletes	<i>Aletes humilis</i>	ARNF Local Concern	Primarily north or west facing slopes in Ponderosa pine/Douglas-fir communities with decomposed granite derived soils in the crevices and cracks of rock outcrops.	Marginally suitable	No	NA
Wild sarsaparilla	<i>Aralis nudicaulis</i>	ARNF Local Concern	Cool ravines, foothills and montane. Moist to dry wooded areas.	Yes	Yes – see text	1, 2, 4, 6, 7, 8
Paper birch	<i>Betula papyrifera</i>	ARNF Local Concern	Cool, north-facing ravines in foothills	Yes	No	NA
Dewey sedge	<i>Carex deweyana</i>	ARNF Local Concern	Moist foothill and montane ravines.	Yes	Yes – see text	1, 2, 4, 5, 7, 8
Lesser panicled sedge	<i>Carex diandra</i>	Region 2 Sensitive	Montane and subalpine fens; over 6,000 feet.	No	No	NA
Woollyfruit sedge	<i>Carex lasiocarpa</i>	ARNF Local Concern	Subalpine fens.	No	No	NA
Mud sedge	<i>Carex limosa</i>	ARNF Local Concern	Fens; montane or subalpine peatlands; often as part of a floating mat community adjacent to an open water system.	No	No	NA
Livid sedge	<i>Carex livida</i>	ARNF Local Concern	Montane and subalpine fens over 6,400 feet	No	No	NA
Peck's sedge	<i>Carex peckii</i>	ARNF Local Concern	Cool shaded gulches, Front Range foothills	Yes	No	NA
Sprengel's sedge	<i>Carex sprengelii</i>	ARNF Local Concern	Moist soil in cool ravines in the foothills	Yes	Yes – see text	2, 4
Enchantress's nightshade	<i>Circaea alpine</i>	ARNF Local Concern	Moist to wet woods and cool ravines.	Yes	Yes – see text	4, 5, 7
Purple cinquefoil	<i>Comarum palustre</i>	ARNF Local Concern	Grows in bogs, marshes, wet meadows, creek banks, and lake margins.	Marginally suitable	No	NA
Yellow coralroot	<i>Corallorhiza trifida</i>	ARNF Local Concern	Montane and subalpine forests; cool, moist habitats.	Yes	No	NA
Spring coralroot	<i>Corallorhiza wisteriana</i>	ARNF Local Concern	Semi-shade in montane aspen and pine.	Yes	No	NA
Bunchberry	<i>Cornus canadensis</i>	ARNF Local Concern	Subalpine forests	No	No	NA
Hazelnut	<i>Corylus cornuta</i>	ARNF Local Concern	Cool ravines in the foothills	Yes	No	NA
Tall blue lettuce	<i>Lactuca biennis</i>	ARNF Local Concern	Clearings in the foothill canyons	Yes	Yes – see text	1, 4, 5
Rocky Mountain blazing star	<i>Liatris ligulistylis</i>	ARNF Local Concern	Moderate moisture to moist; prairies, meadows, streambanks. Loamy soil.	Marginally suitable	No	NA
Utah lupine	<i>Lupinus epidus var. utahensis</i>	ARNF Local Concern	Gravelly to sandy soils, sagebrush	No	No	NA

Table 3 (cont.)
Results of URS Rare Plant Survey

Common Name	Scientific Name	Status	Habitat	Suitable Habitat Present?	Observed in 2010 Survey?	Map Numbers (Appendix A)
Stiff club-moss	<i>Lycopodium annotinum</i>	ARNF Local Concern	Subalpine spruce thickets and willows	No	No	NA
Fringed loosestrife	<i>Lysimachia ciliata</i>	ARNF Local Concern	Wetlands in the Front Range, 5100 – 8000 feet elevation	Yes	No	NA
Colorado tansy-aster	<i>Macheeranthera coloradensis</i>	Region 2 Sensitive	Alpine, subalpine; park grasslands, scree slopes, dry tundra; 7,600-13,000 feet.	No	No	NA
Leechleaf blazingstar	<i>Mentzelia sinuata</i>	ARNF Local Concern	Shale outcrops, Front Range foothills	No	No	NA
Buckbean	<i>Menyanthes trifoliata</i>	ARNF Local Concern	Upper montane and subalpine ponds	No	No	NA
Budding monkeyflower	<i>Mimulus gemmipatus</i>	Region 2 Sensitive	Subalpine, montane; seepages, wet banks; 8,400-11,120 feet.	No	No	NA
Sweet coltsfoot	<i>Petasites saggitatus</i>	ARNF Local Concern	Marshy meadows in intermountain parks and meadows.	No	No	NA
Greenland primrose	<i>Primula egalikensis</i>	Region 2 Sensitive	Extreme rich fens 9,000-10,000 feet in Colorado	No	No	NA
Silvery primrose	<i>Primula incana</i>	ARNF Local Concern	Alkaline clay soil in floodplains and moist open meadows.	No	No	NA
Pictureleaf wintergreen	<i>Pyrola picta</i>	ARNF Local Concern	Cool, moist woods on north or northeast-facing slopes, 6,000-10,000 feet	Yes	No	NA
Dwarf raspberry	<i>Rubus arcticus</i> ssp. <i>acaulis</i> (<i>Cylactis arctica</i> ssp. <i>acaulis</i>)	Region 2 Sensitive	Wetlands; willow carrs, mossy stream sides; 7,000-9,500 feet in Colorado.	Marginally suitable	No – see text	NA
Silver willow	<i>Salix candida</i>	Region 2 Sensitive	Foothills, montane; rich fens, pond edges, permanently saturated peatlands; 8,800-10,600 feet.	No	No	NA
Autumn willow	<i>Salix serissima</i>	Region 2 Sensitive	Montane; calcareous fens, permanently saturated peatlands; 7,800-9,300 feet	No	No	NA
Maryland sanicle	<i>Sanicula marilandica</i>	ARNF Local Concern	Along streams in cool canyons in foothills	Yes	Yes – see text	8
False melic	<i>Schizachne purpurascens</i>	ARNF Local Concern	Deeply shaded forested slopes	Yes	Yes – see text	1, 2, 3, 8
Sphagnum	<i>Sphagnum angustifolium</i>	Region 2 Sensitive	Subalpine iron fens and fens, nine locations in Colorado.	No	No	NA
Baltic sphagnum	<i>Sphagnum balticum</i>	Region 2 Sensitive	Subalpine iron fens, two locations in Colorado.	No	No	NA

Table 3 (cont.)
Results of URS Rare Plant Survey

Common Name	Scientific Name	Status	Habitat	Suitable Habitat Present?	Observed in 2010 Survey?	Map Numbers (Appendix A)
All other sphagnum species not included as sensitive	<i>Sphagnum</i> spp.	ARNF Local Concern	Subalpine fens.	No	No	NA
Lesser bladderwort	<i>Utricularia minor</i>	Region 2 Sensitive	Low nutrient lakes and ponds, mostly in peatland	No	No	NA

Note:

NA = Not Applicable

Eight target species had been previously reported at Gross Reservoir (Shapins Associates 2002, CNHP 2009). URS observed and documented seven of eight previously recorded species and found additional for all of the 7 species. All recorded species are discussed below. All of the species occurred in riparian areas. Occurrences in each of the drainages were considered to represent separate populations under current conditions, although historically (prior to Gross Reservoir) these populations were likely connected.

Wild Sarsaparilla (*Aralia nudicaulis*)

A total of 5,082 wild sarsaparilla were found (Table 4). *Aralia nudicaulis* is a regular component of riparian areas at Gross Reservoir and is present throughout the extent of its habitat. The species was recorded in 5 populations and in 25 locations. Previous sightings by Shapins Associates (2002) were confirmed in 6 locations. Wild sarsaparilla is locally abundant where present, with subpopulations of up to 2,000 individuals recorded. The largest population occurs within South Boulder Creek (9 subpopulations, 2577 individuals).

Within Gross Reservoir, *A. nudicaulis* occurs in shaded mesic or riparian terraces. Within narrow canyons, populations are usually found along and up the toe slope, but along South Boulder Creek, populations occur on creek-side terraces occupied by mixed conifer stands. It appears that the species can tolerate other herbaceous vegetation in moister areas. In dryer areas, *A. nudicaulis* generally out-competes other herbaceous vegetation and can form monocultures. In mesic areas, associated herbaceous species include twisted stalk (*Streptopus lanceolatus*), twinberry honeysuckle (*Lonicera involucrata*), Wood's rose, sticky purple geranium (*Geranium viscosissimum*), baneberry (*Actaea rubra*), field horsetail (*Equisetum arvense*), and fireweed (*Chamerion angustifolium*).

At the time of observation, most individuals were past flowering and fruiting. In Forsythe Canyon, plants exhibited a slight yellowish-green color which simplified identification against similar looking vegetation.

Table 4
Locations and Numbers of Rare Plants Observed in URS 2010 Survey

	Forsythe Canyon	Winiger Gulch	South Boulder Creek	West Tributary	East Tributary	North Shoreline	Total
Wild sarsaparilla <i>Aralia nudicaulis</i>	870	599	2,557	1,150	35	0	5,082
Dewey sedge <i>Carex deweyana</i>	189	146	0	7	0	0	342
Sprengle's sedge <i>Carex sprengelii</i>	37	616	0	0	0	0	653
Enchantresses nightshade <i>Ciraea alpina</i>	0	707	0	200	0	0	907
Tall blue lettuce <i>Lactuca biennis</i>	27	116	0	0	0	0	149
Maryland sanicle <i>Sanicula marilandica</i>	0	0	0	0	32	0	32
False melic <i>Schizachne purpurascens</i>	Present	0	0	0	Present	Present	3 Locations

Dewey Sedge (*Carex deweyana*)

A total of 342 Dewey sedges were found (Table 4). *Carex deweyana* was recorded in 3 populations and at 26 locations. One location previously reported by Shapins Associates (2002) was re-located. This species was observed in the understory of low dense cover along Winiger Gulch, Forsythe Creek, and along the west unnamed tributary on the south side of the reservoir. The species was also recorded further upstream in both Winiger and Forsythe creeks. Most plants were observed growing on terraces near perennial water sources.

C. deweyana does not form dense stands, but mostly occurs in small clusters. More plants may be present than recorded; the plant is commonly hidden by taller vegetation making it difficult to count individuals. It also resembles a low growing bunch grass when not in flower. Associated species include a wide diversity of herbaceous and shrub plants in riparian habitat.

Sprengle's Sedge (*Carex sprengelii*)

A total of 663 Sprengle's sedge were found (Table 4). *Carex sprengelii* was recorded in 2 populations at 14 locations. The population previously reported by CNHP (2009) in Winiger Gulch was found, and an additional population was found in Forsythe.

The species occurs along stream terraces within Winiger Gulch and Forsythe Creek. Sprengel's sedge prefers sites slightly above bankfull and was observed both in the understory of dense cover and within more open areas. Unlike Dewey sedge, larger populations of Sprengel's sedge occurred where more light was available, with the largest population occurring on Winiger Creek at the confluence of the creek and an unnamed tributary.

The plant has larger leaves than *C. deweyana*, with drooping inflorescences that are held above the plant. Relatively few plants had fruiting culms.

Enchantress's Nightshade (*Circaea alpina*)

A total of 907 enchantress's nightshade were found (Table 4). *Circaea alpina* was recorded in 3 populations and at 6 locations. In Winiger Gulch, the species was recorded in three locations within an unnamed side drainage and in one large area in the main channel, where more than 500 individuals were recorded (Appendix A, Figures 4 and 5).

In Gross Reservoir, *Circaea alpina* occurs on unvegetated, heavily shaded stream banks of small perennial tributaries, growing to the water's edge. Due to the dense shade it prefers, the species was always observed with little or no other associated herbaceous vegetation.

Tall Blue Lettuce (*Lactuca biennis*)

A total of 149 tall blue lettuce were found. *Lactuca biennis* was recorded in 3 populations and at 5 locations. This species was observed on riparian terraces along small and large tributaries. A previously recorded population where one individual was found in 2001 (Shapins 2002) was confirmed with 26 plants at roughly the same location, in Forsythe Canyon upstream of the expanded reservoir. The largest population observed occurred in full sun within a disturbed herbaceous riparian area adjacent to Winiger Gulch. It appears to favor more open areas within the normally shaded stream channels and it tolerates competition, even growing within patches of Canada thistle (Appendix B, Photograph 11).

L. biennis grows to approximately 4.5 feet in flower, allowing the species to tower above other herbaceous riparian vegetation. A similar species (*Lactuca puchella*) also occurs within Forsythe Gulch but is lower growing.

Maryland Sanicle (*Sanicula marilandica*)

A total of 32 Maryland sanicle plants were found (Table 4). All of the *Sanicula marilandica* occurs in the east tributary on the south side of the reservoir, at five locations (Appendix A, Figure 8). The lowest elevation location in the drainage generally corresponds to the location where several plants of this species were observed in 2001 (Shapins Associates 2002). One location with 4 plants was observed upstream from the edge of the Denver Water property and additional plants probably occur further upstream on private land. The species was observed growing along the stream bank in moderate shade with other riparian herbaceous vegetation.

During time of observation, the species was past flowering, but fruits were visible. Associated species included *Geum macrophyllum*, which the species resembles both in leaf and fruit.

False Melic (*Schizachne purpurascens*)

False melic was observed at three sites in 2010, in Forsythe Canyon, the east tributary on the south side of the reservoir, and along the north shoreline of the reservoir. The species was not correctly recognized during the field work but specimens were collected and it was identified after surveys were completed. It is undoubtedly present at more locations. *Schizachne purpurascens* appears to be a regular but uncommon constituent of the riparian community in almost all drainages.

Dwarf raspberry (*Rubus arcticus* var. *acaulis*, *Cylactis arctica* ssp. *acaulis*)

Rick Brune reported an occurrence of this species along Forsythe Gulch in 2001 upstream of Gross Reservoir (Shapins Associates 2002). He reported that at least 8 individuals were present. No specimen was collected. An attempt to re-find this population was made by URS in 2010 (Appendix C), but no evidence of this species was found at the GPS location recorded by Rick Brune. The URS survey was conducted later in the season when the species may have become dormant. The location that was searched was a mesic riparian area with mineral soils, and not typical of the habitats in which this species generally occurs. The location for this species reported by Rick Brune is about 500 feet upstream of the maximum disturbance associated with the Proposed Action, and would not be affected by any project activities.

3.3 PLANT COMMUNITIES OF LOCAL CONCERN

USFS identified 8 plant communities of local concern with the potential to occur at Gross Reservoir and indicated that 4 of them had been previously identified as present (Table 5). Because surveys for sensitive plant communities were planned to be done by CNHP, URS biologists only noted presence or absence and did not record detailed observations. CNHP was unable to do the planned field surveys because of schedule conflicts during the field season. Each plant community known to occur at Gross Reservoir is briefly discussed below.

Table 5
Results of Survey for Plant Communities of Local Concern

Common Name	Scientific Name	Previously Reported	Observed in 2010 Survey
Colorado blue spruce	<i>Picea pungens</i>	Yes	Yes
Ponderosa pine / spike fescue	<i>Pinus ponderosa</i> / <i>Leucopoa kingii</i>	No	No
Ponderosa pine / antelope bitterbrush	<i>Pinus ponderosa</i> / <i>Purshia tridentata</i>	No	No
Relictual prairie grass riverine community	<i>Spartina pectinata</i> – <i>Sorghastrum avenaceum</i> – <i>Andropogon gerardii</i> – <i>Dicahanthelium oligosanthes</i> – <i>Hypericum majus</i>	No	No

Table 5 (cont.)
Results of Survey for Plant Communities of Local Concern

Common Name	Scientific Name	Previously Reported	Observed in 2010 Survey
Ponderosa pine old growth	<i>Pinus ponderosa</i>	Yes	No
Upwelling / dome springs / seeps		No	No
Thinleaf alder / mesic forb riparian shrubland	<i>Alnus incana</i> / <i>mesic forbs</i> <i>shrubland</i>	Yes	Yes
Foothills riparian shrubland	<i>Betula occidentalis</i> / <i>Maianthemum</i> <i>stellatum</i> or other forbs	Yes	Yes

Colorado Blue Spruce

The list provided by USFS documented that this community had previously been identified at Gross Reservoir. URS found relatively few blue spruces within the study area and only in Forsythe Canyon. Blue spruce were observed along Forsythe Canyon below the waterfall, as shown in Photos 16 and 21 in Appendix C. The area of denser spruce (photo 21) appears to generally correspond to the description of the Blue spruce/Thinleaf alder woodland (*Picea pungens*/*Alnus incana* ssp. *tenuifolia*) in the *Field guide to the Wetland and Riparian Plant Associations of Colorado* (CNHP 2003). This community occurs in small patches in canyons with cold air drainage and limited sunlight.

Ponderosa Pine Old Growth

The survey did not record any areas of old growth ponderosa pine. Information on old growth forest in the Gross Reservoir area was obtained from the USFS GIS database after the completion of the 2010 field survey. Existing old growth occurs only on 21.5 acres, a small portion of the Gross Reservoir study area, along the west edge of the study area near Winiger Gulch and South Boulder Creek. All of the old growth in the Gross Reservoir study area occurs at lower elevation sites dominated by ponderosa pine. Old growth development areas are mature forests that are relatively close to becoming old growth (USFS 1997). Areas designated by ARNF for as old growth development occupy 450 acres above the existing reservoir, about half of the terrestrial habitat on USFS lands, and are located in the southwestern quarter of the study area.

Thinleaf Alder/Mesic Forb Riparian Shrubland and Foothills Riparian shrubland

CNHP (2004, 2009) identified two ARNF plant communities of local concern in the Gross Reservoir area. The foothills riparian shrub river birch/mesic forb community was reported to occur along South Boulder Creek above Gross Reservoir, and the thinleaf alder/mesic forb along Winiger Gulch upstream of the reservoir (CNHP 2004, 2009). Shapins Associates (2002) reported that foothills riparian shrub also occurs along much of Forsythe Canyon, and a mix of these communities was observed along two of the drainages along the south side of the reservoir during surveys by URS in 2010. The foothills riparian shrub community has a CNHP conservation rating of G4/S2, and the thinleaf alder/mesic forb community has a rating of G3/S3.

URS observed these communities along the drainages flowing into Gross Reservoir during the 2010 survey. Previous delineation of wetlands and riparian areas in 2005 had mapped the extent of riparian shrub communities in the study area. Although the 2005 wetland and riparian surveys used vegetation structure (e.g., tree, shrub, herbaceous) rather than composition, it is likely that all or most of the wetlands identified as scrub-shrub wetlands (PSS) and palustrine emergent wetlands (PEM)/PSS and riparian areas identified as riparian shrubland and riparian wood/shrubland are likely to be these communities.

3.4 NOXIOUS WEEDS

A total of 7 species of noxious weeds (Colorado Department of Agriculture 2010) were observed within the study area. These include oxeye daisy (*Leucanthemum vulgare*), Dalmation toadflax (*Linaria dalmatica*), redstem filaree (*Erodium cicutarium*), common mullein, musk thistle, leafy spurge (*Euphorbia esula*), and Canada thistle.

Oxeye daisy occurs along South Boulder Creek above the high water mark of the reservoir. Several larger populations were observed along the shoreline. Other weeds were present around trails or other disturbed areas.

Impacts of the Proposed Action and other alternatives are analyzed in the USFS Technical Report (Biological Evaluation) and in the FEIS.

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Surveys were conducted for rare plant species and plant communities of concern in July and August 2010. A total of 7 target plant species and 3 plant communities were recorded within the Gross Reservoir study area. Multiple populations of each species were recorded with previous records (Shapins Associates 2002, CNHP 2009) confirmed.

Almost all rare plants observed occur within side drainages in riparian or wetland areas. Many prefer riparian understory in dense shade and are therefore difficult to locate.

Aralia nudicaulis was most frequently observed target species. Populations occurred within all but one drainage area. Conversely, *Sanicula marilandica* occurred within only one drainage. An accurate search image was not available for *Schizachne purpurascens*. Observed locations were recorded and populations estimated from collected samples.

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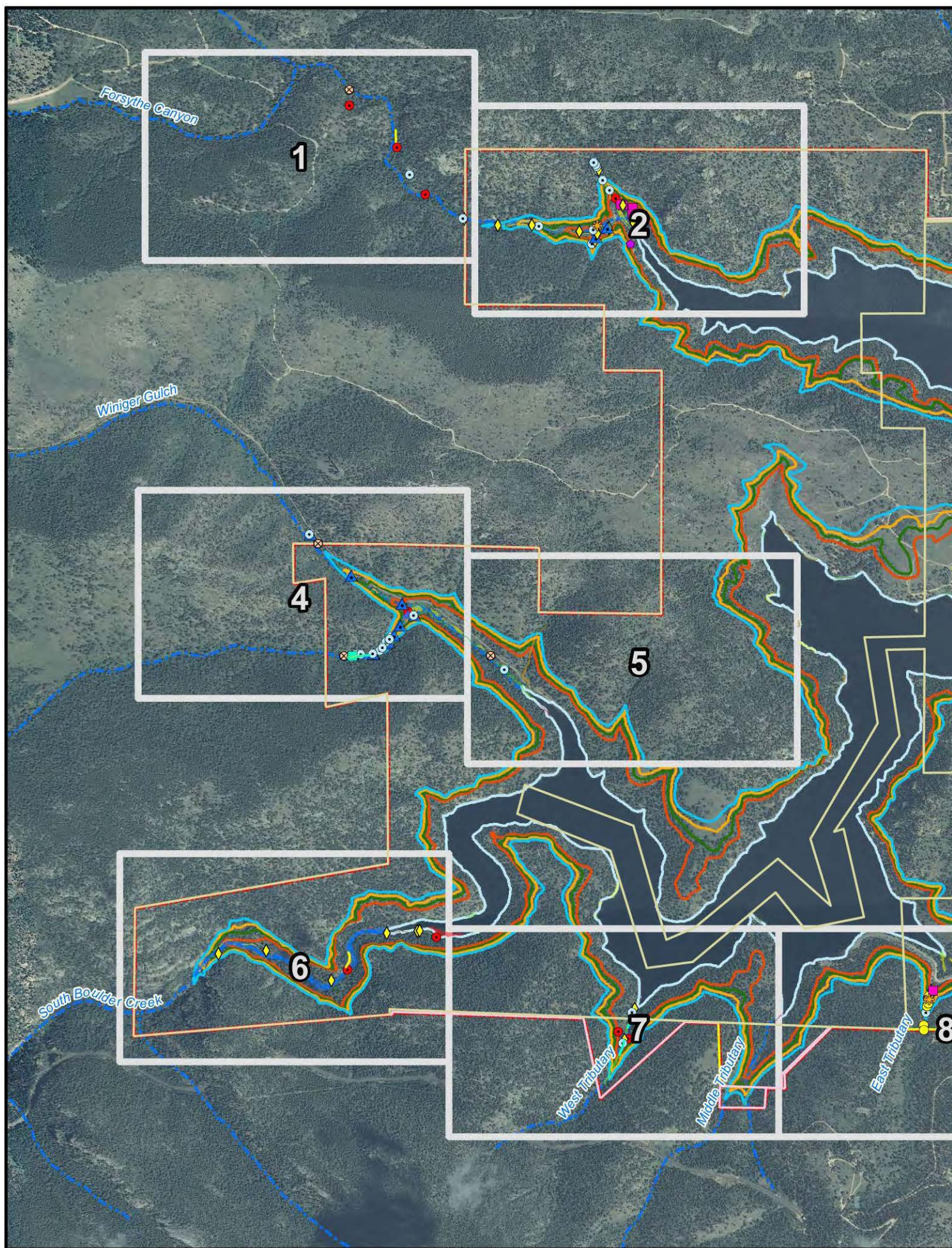
- Brune, Richard. 2003. A vegetation survey for threatened, endangered, and sensitive plants along existing and proposed access roads to the Gross Reservoir Dam. FERC Project No. 2035, Amended. Prepared for Denver Water.
- Carter, Jack L. 2006. Trees and Shrubs of Colorado. Mimbres Publishing, Silver City, New Mexico.
- Chapman, S.S., Griffith, G.E., Omernik, J.M., Price, A.B., Freeouf, J., and Schrupp, D.L., 2006, Ecoregions of Colorado (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,200,000).
- Colorado Department of Agriculture. 2010. Colorado Noxious Weed List. Available at <http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1174084048733>. Date of last update unknown. Accessed November 18, 2010.
- Colorado Natural Heritage Program (CNHP). 2009. Survey of Critical Biological Resources in Boulder County, Colorado 2007-2008. Prepared for Boulder County Parks and Open Space. Colorado State University, Fort Collins, Colorado.
- _____. 2003. Field Guide to the Wetland and Riparian Plant Associations of Colorado. College of Natural Resources, Colorado State University.
- Dorn, Robert D. 1997. Rocky Mountain Region Willow Identification Field Guide. U.S. Department of Agriculture, Forest Service, Renewable Resources, Denver, Colorado. R2-RR-97-01
- Hurd, Emerenciana G., Nancy L. Shaw, Joy Mastrogioseppe, Lynda C. Smithman, and Sherel Goodrich. 1998. Field Guide to Intermountain Sedges. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-10.
- Johnston, Barry C. 2001. Field Guide to Sedge Species of the Rocky Mountain Region. The genus *Carex* in Colorado, Wyoming, western South Dakota, western Nebraska, and western Kansas. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. Publication R2-RR-01-03.
- Natural Resources Conservation Service (NRCS). 2011. The PLANTS Database (<http://plants.usda.gov>, 13 December 2011). National Plant Data Team, Greensboro, NC 27401-4901 USA.
- Shaw, Robert D. 2008. Grasses of Colorado. University Press of Colorado, Boulder, Colorado
- Weber and Wittmann. 2003. Flora of Colorado – East Slope. University of Colorado Press, Boulder, Colorado.
- Shapins Associates. 2002. Article 410. Plan to Protect Rare and Sensitive Plant Species. In. Gross Reservoir Recreation Management Plan. 2002 draft. Gross Reservoir Hydroelectric Project. FERC Project No. 2035-006.
- Smith, Scott. 2010. Rare Plant Survey for Gross Reservoir, Arapaho National Forest, Boulder County, Colorado. Unpublished report for the U.S Forest Service.

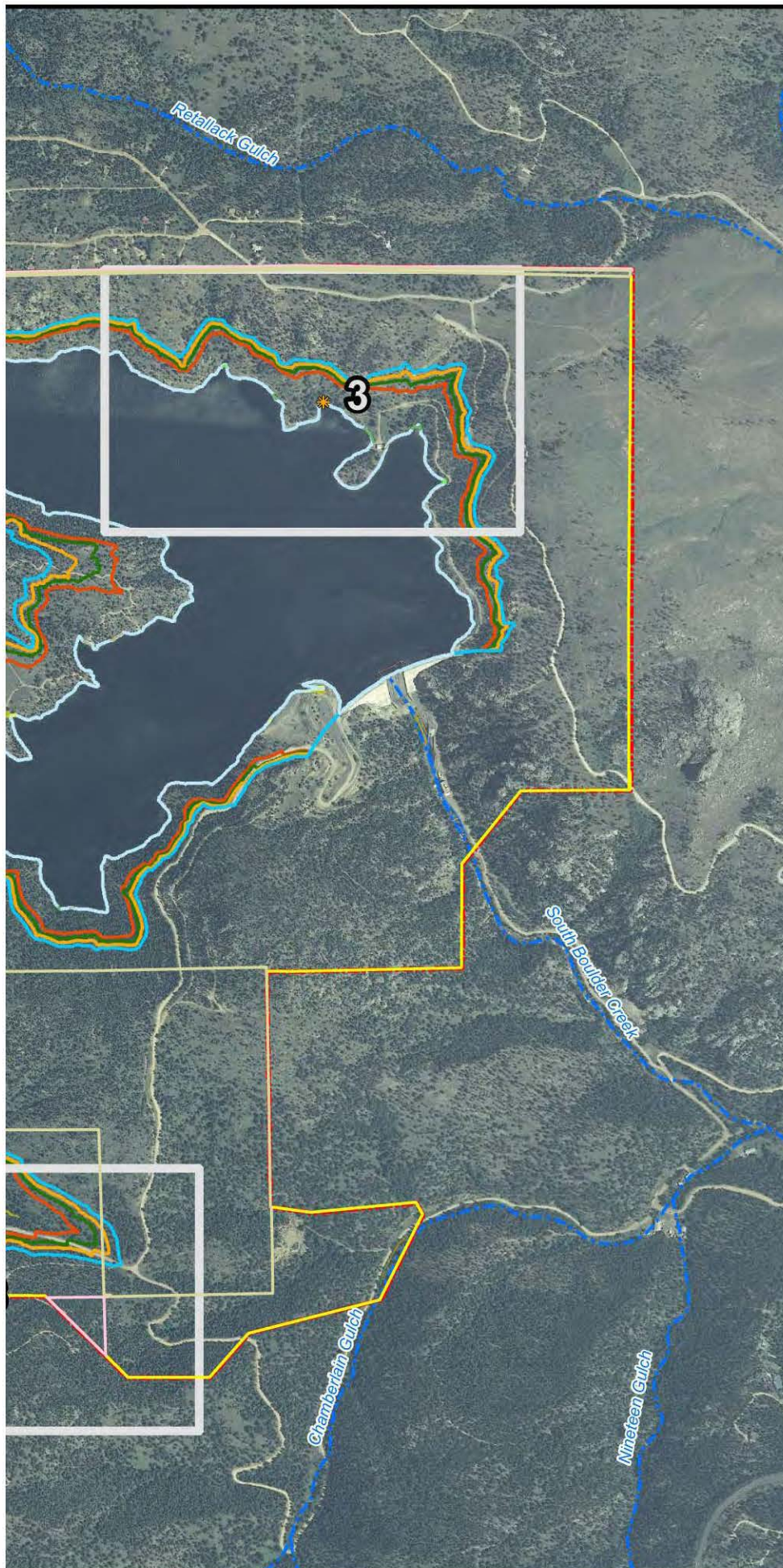
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Appendix A

Maps

Figures start on the following page





Sensitive Plants (URS 2010)

- ◆ *Aralia nudicaulis*
- ~ *Aralia nudicaulis*
- *Pteridium aquilinum*
- *Carex deweyana*
- ▲ *Carex sprengellii*
- *Carex sprengellii*
- *Circea alpina*
- ~ *Circea alpina*
- ⊗ *Lactuca biennis*
- *Sanicula marilandica*
- ⊗ *Schizachne purpurascens*
- ◆ *Polypodium saximontana*

Other Sensitive Plant Locations

- (Shapiro Assoc. 2002,
CNHP 2009)

URS Wetland/Riparian Delineation (2006)

- PEM Wetland
- PSS Wetland
- PEM/PSS Wetland
- Woodland Riparian
- Wood/Shrub Riparian
- Shrubland Riparian
- Other Waters

Alternatives

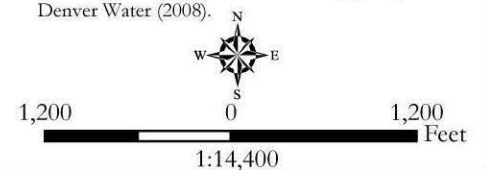
- Existing Gross Reservoir
- Alt. 1a - Prop. Gross at elev. 7410'
- Alt. 13a - Prop. Gross at elev. 7396'
- Alt. 8a and 10a - Prop. Gross at elev. 7384'
- Alt. 1c - Prop. Gross at elev. 7368'

Project Information

- Gross Reservoir Moffat EIS Study Area
- Denver Water Board
- USDA Forest Service - Arapaho
& Roosevelt National Forest
- Private or Right of Way
- ~ Stream/River
- Tiles (1:2,400)

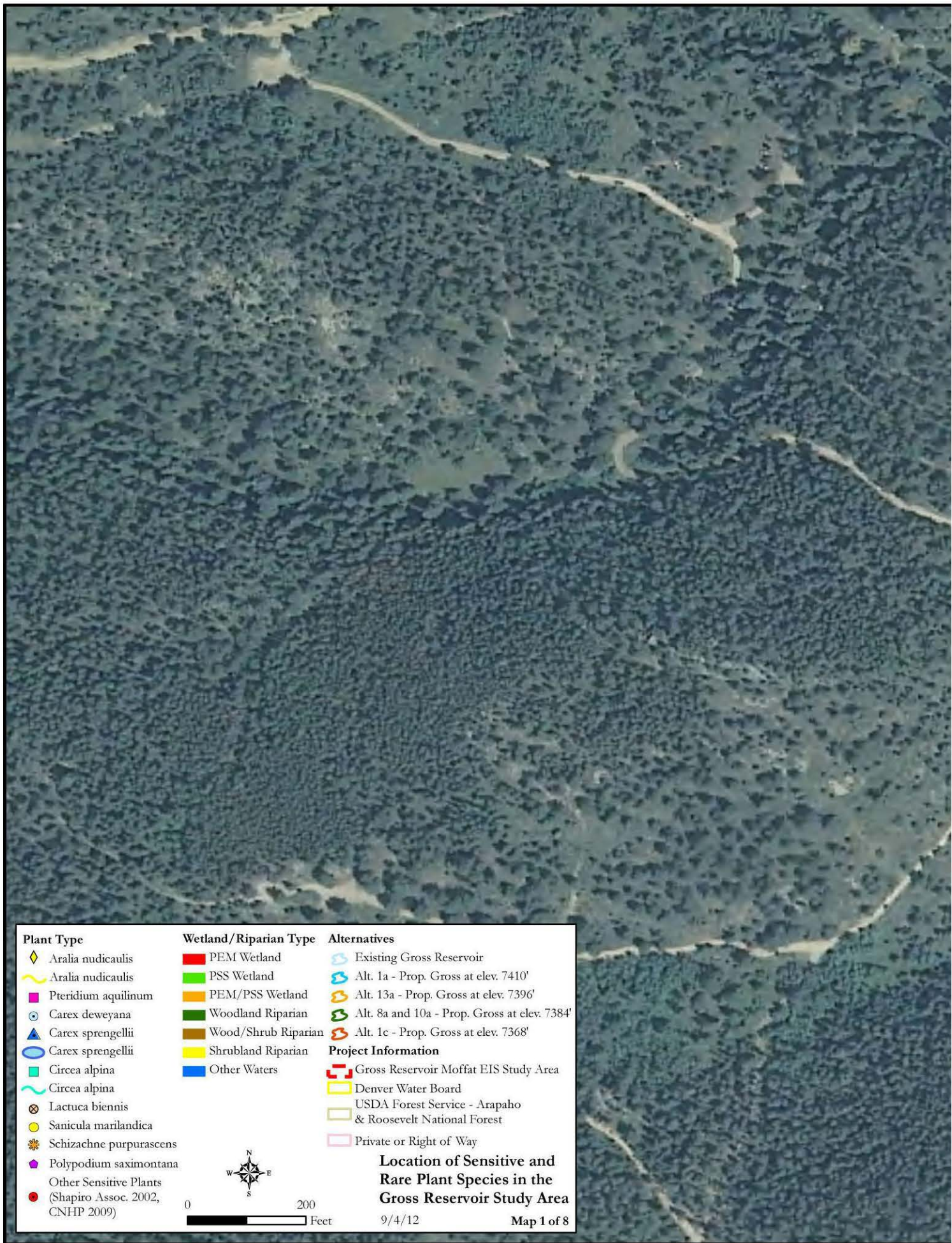
Reference:

Aerial photography from USDA-NRCS (2009).
Land ownership from Boulder County (2006) and
Denver Water (2008).

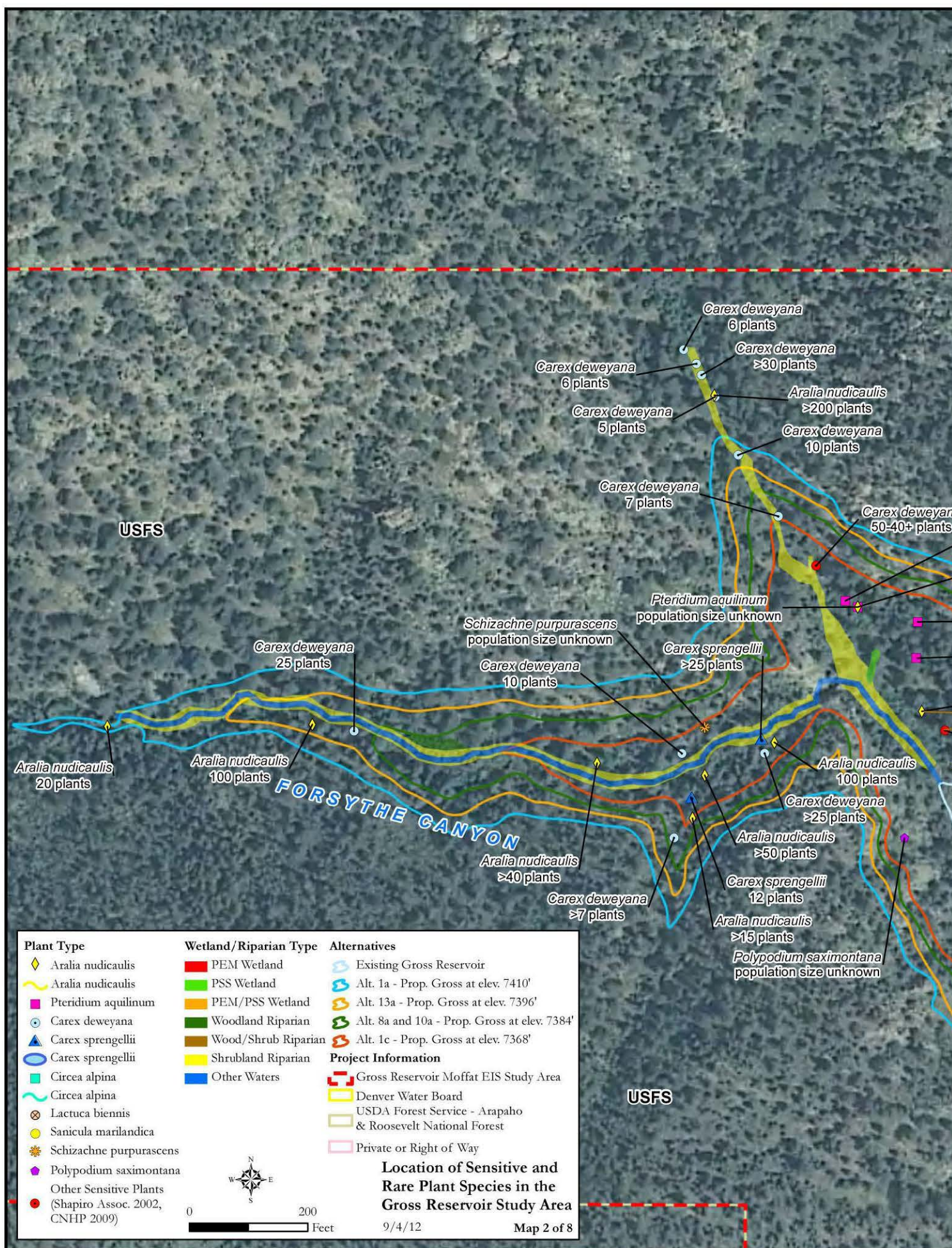


Moffat Collection System
Project FEIS

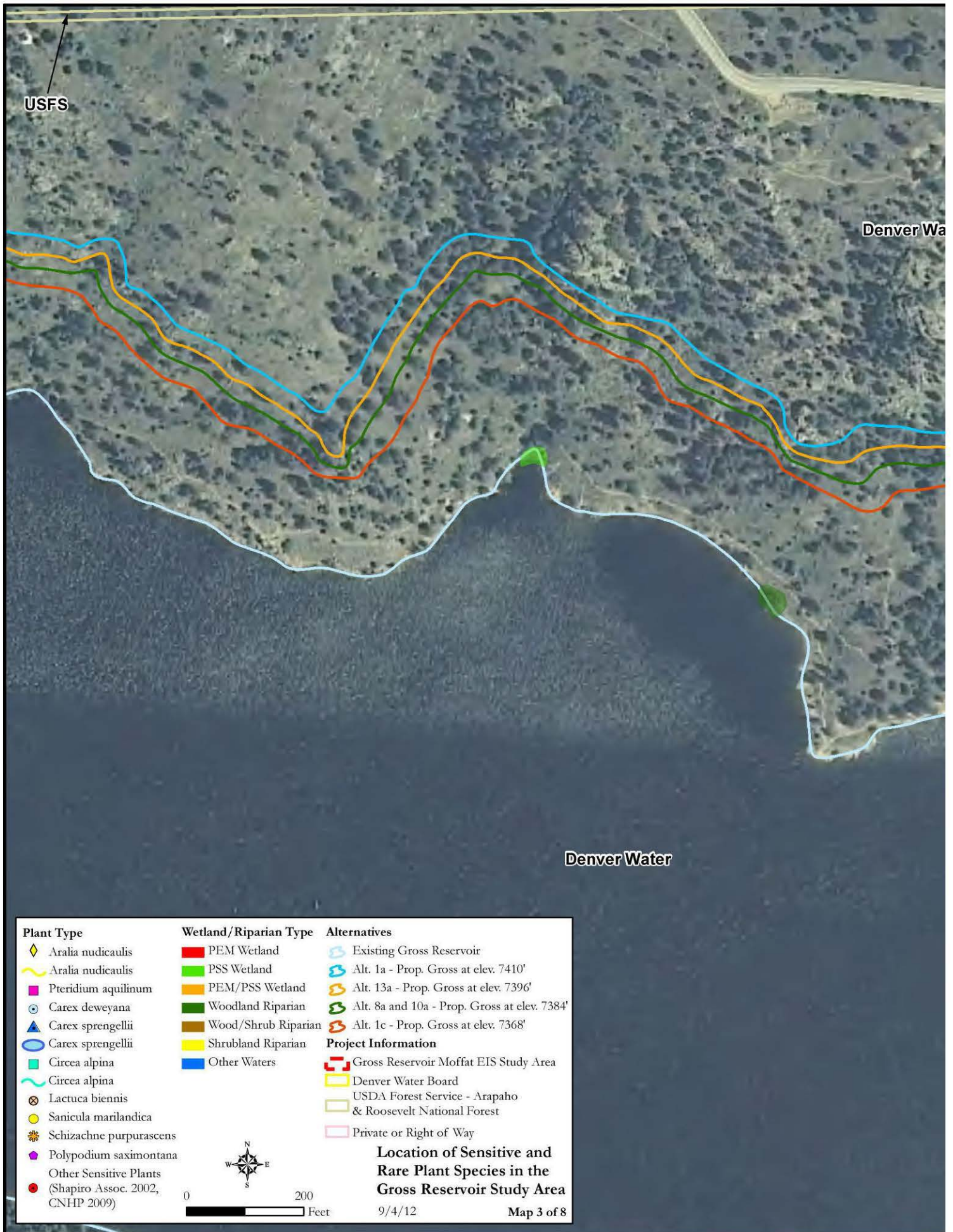
Location of Sensitive and
Rare Plant Species in the
Gross Reservoir Study Area
Index Map





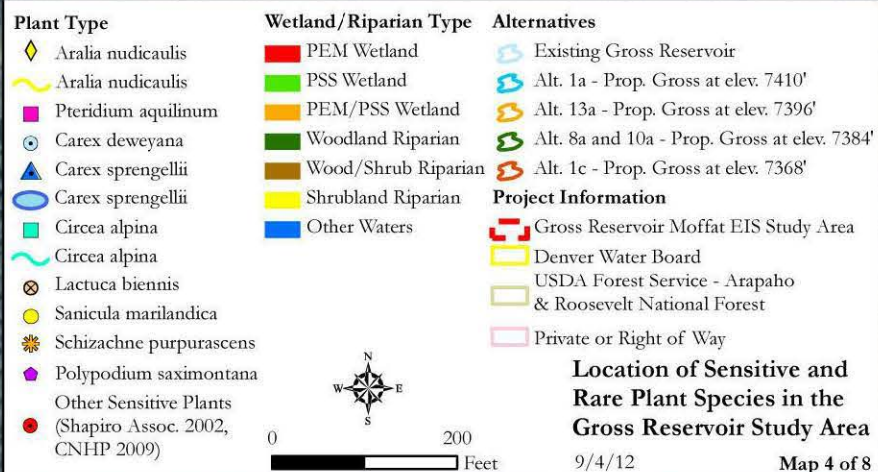


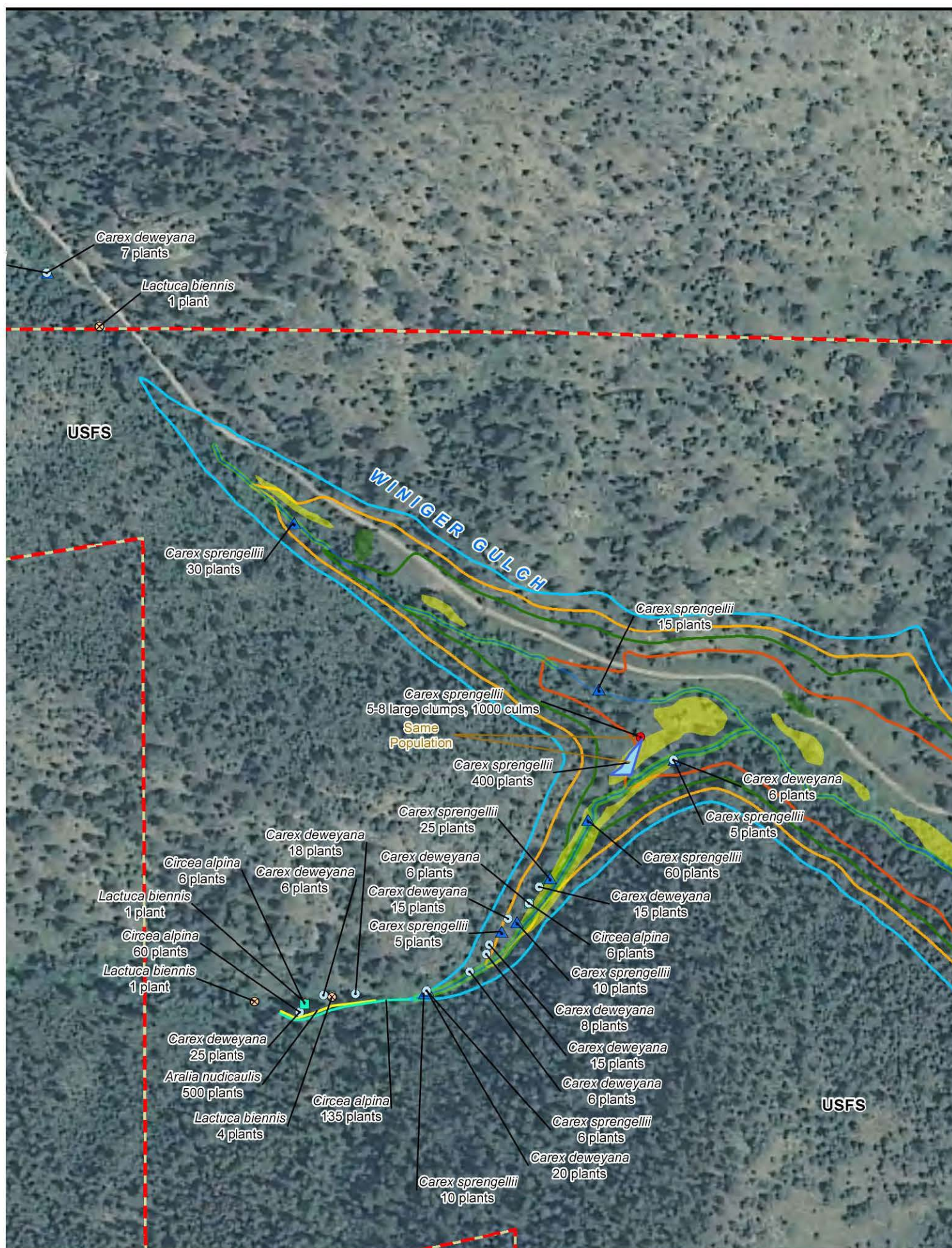


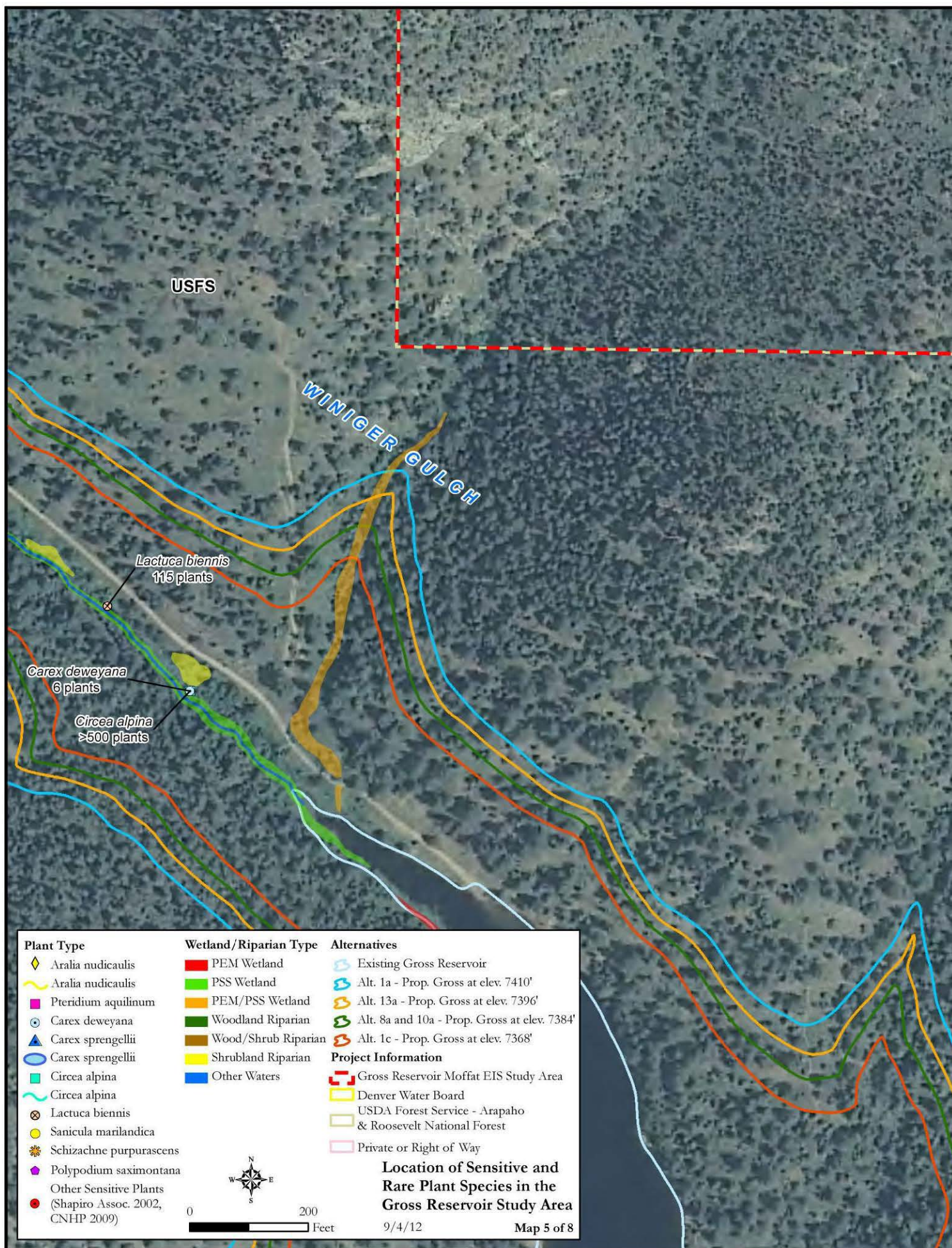




Carex sprengeii
50 plants



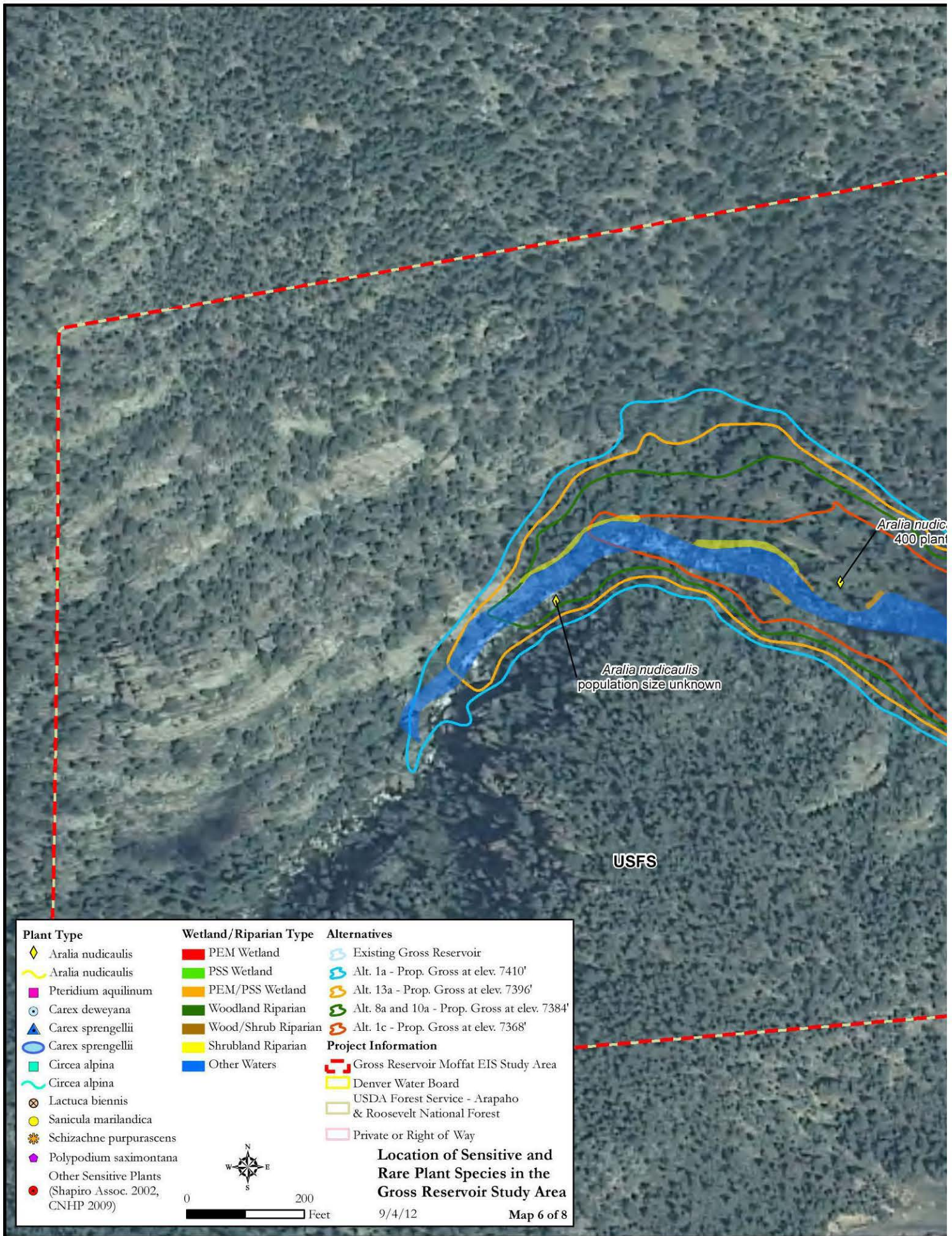


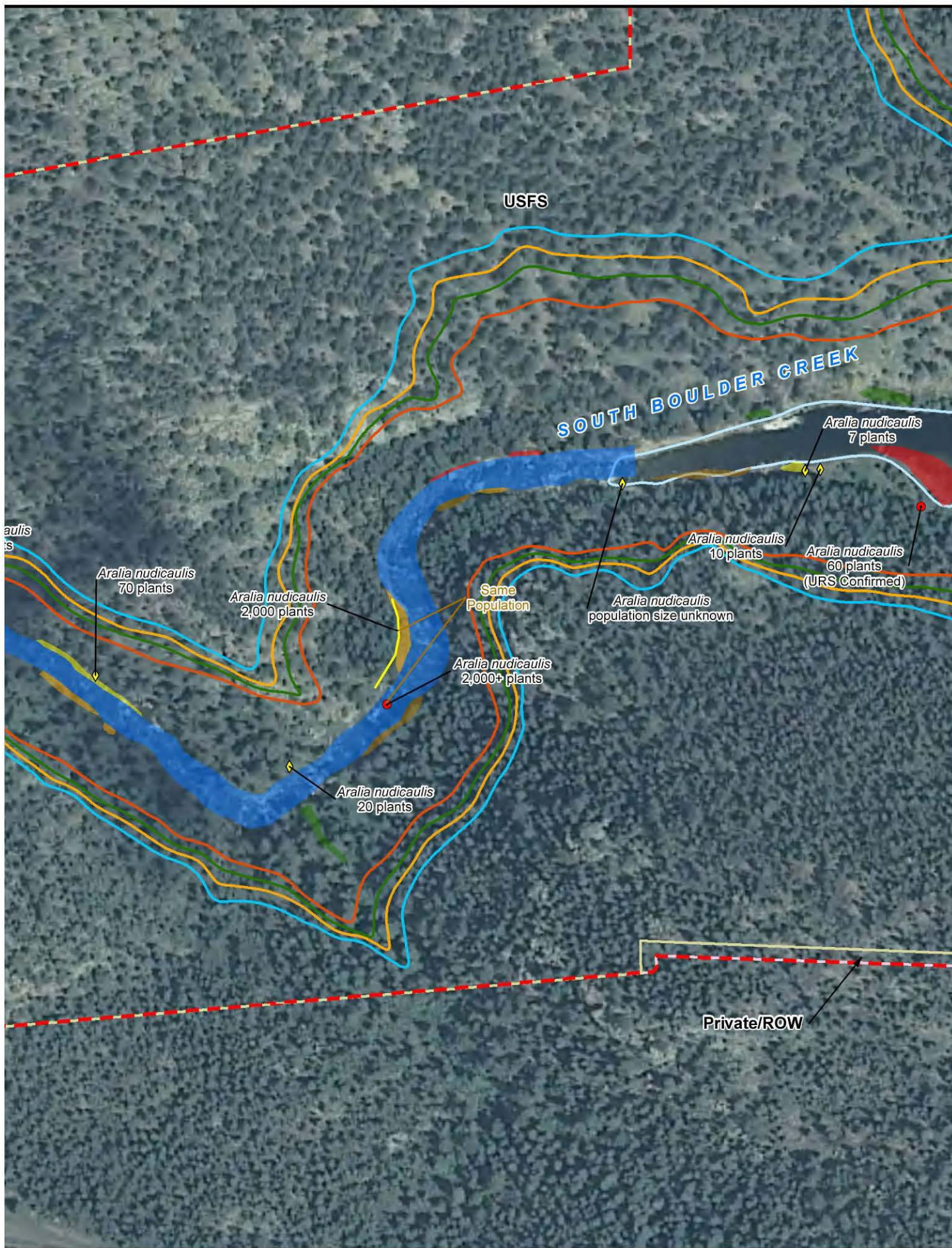


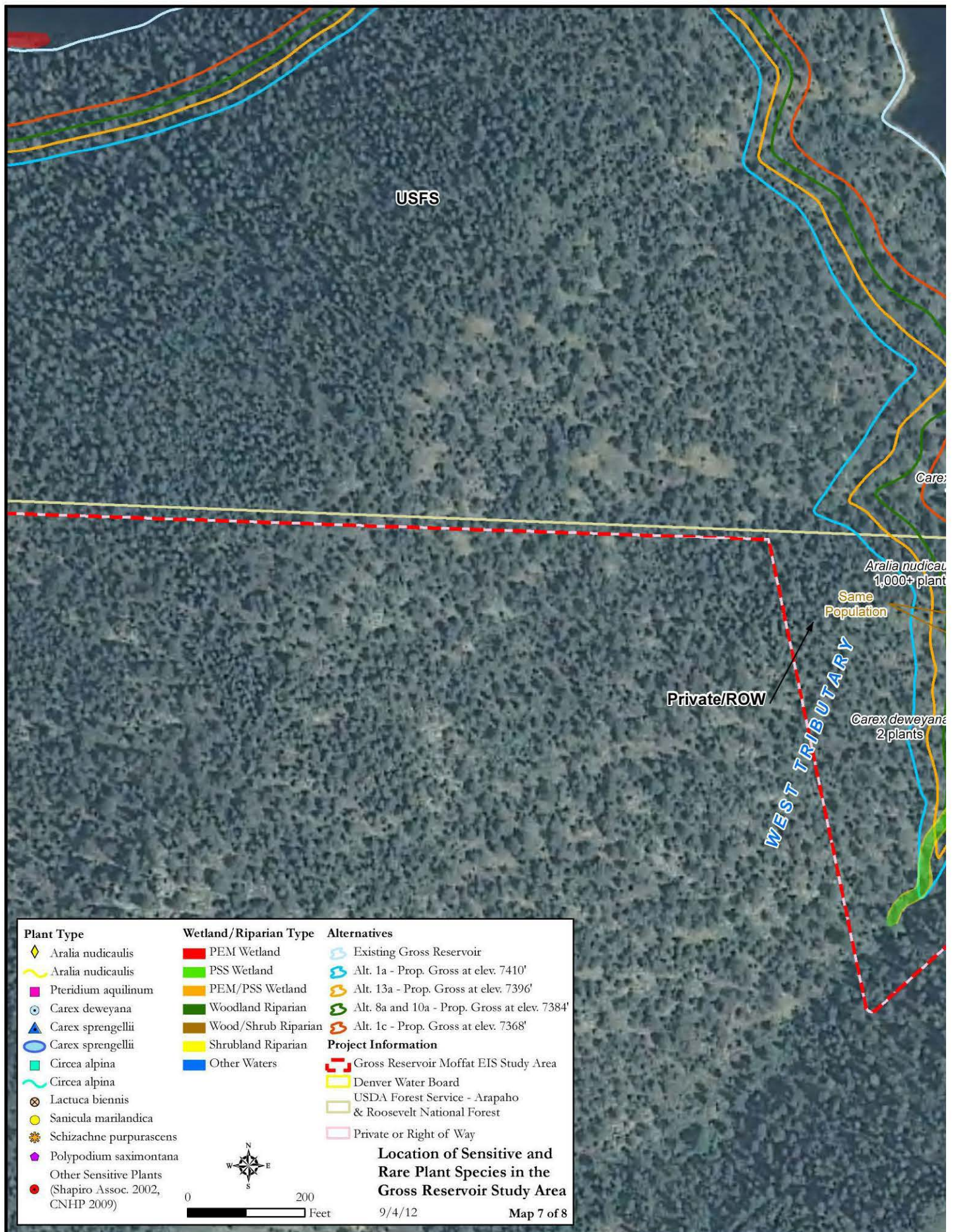


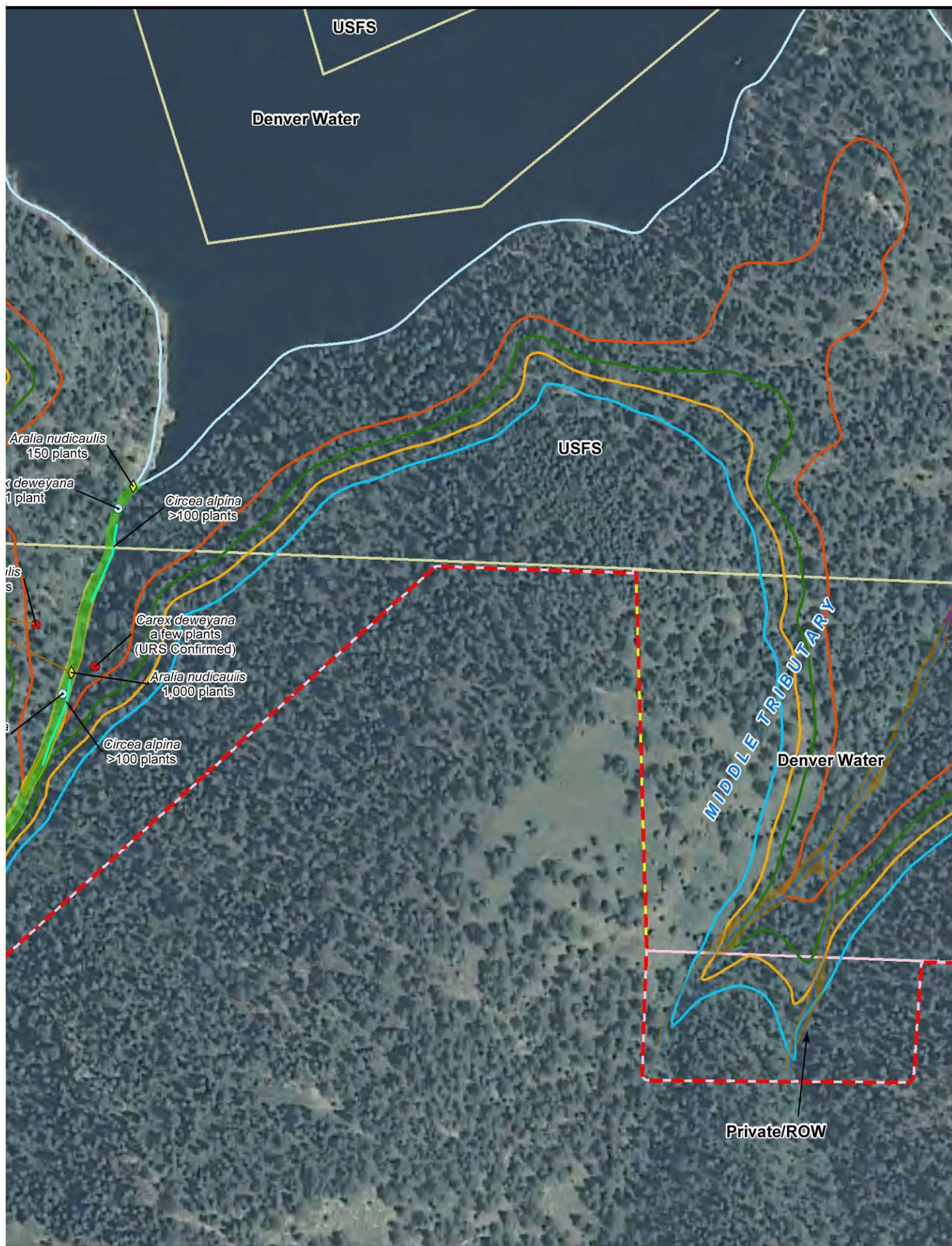
USFS

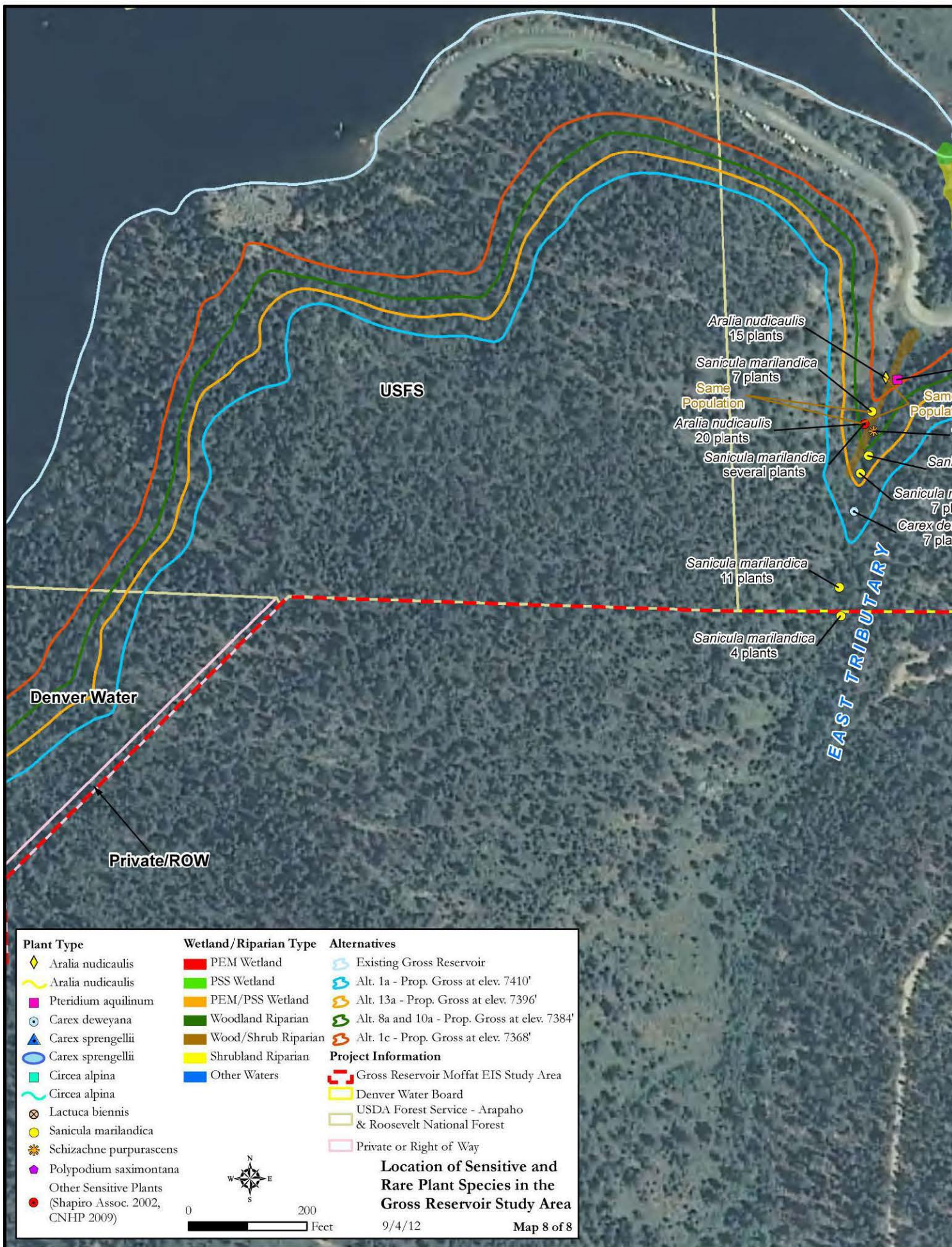
This is an aerial photograph of a forested area. Overlaid on the image are several colored lines: a red dashed rectangle in the upper left corner, and a series of solid contour lines in blue, yellow, green, and orange that follow a diagonal path from the top right towards the bottom right. A small yellow-shaded area is visible near the top right edge, adjacent to a dark, irregular shape that appears to be a body of water. The text 'USFS' is printed in white in the lower-middle section of the image.

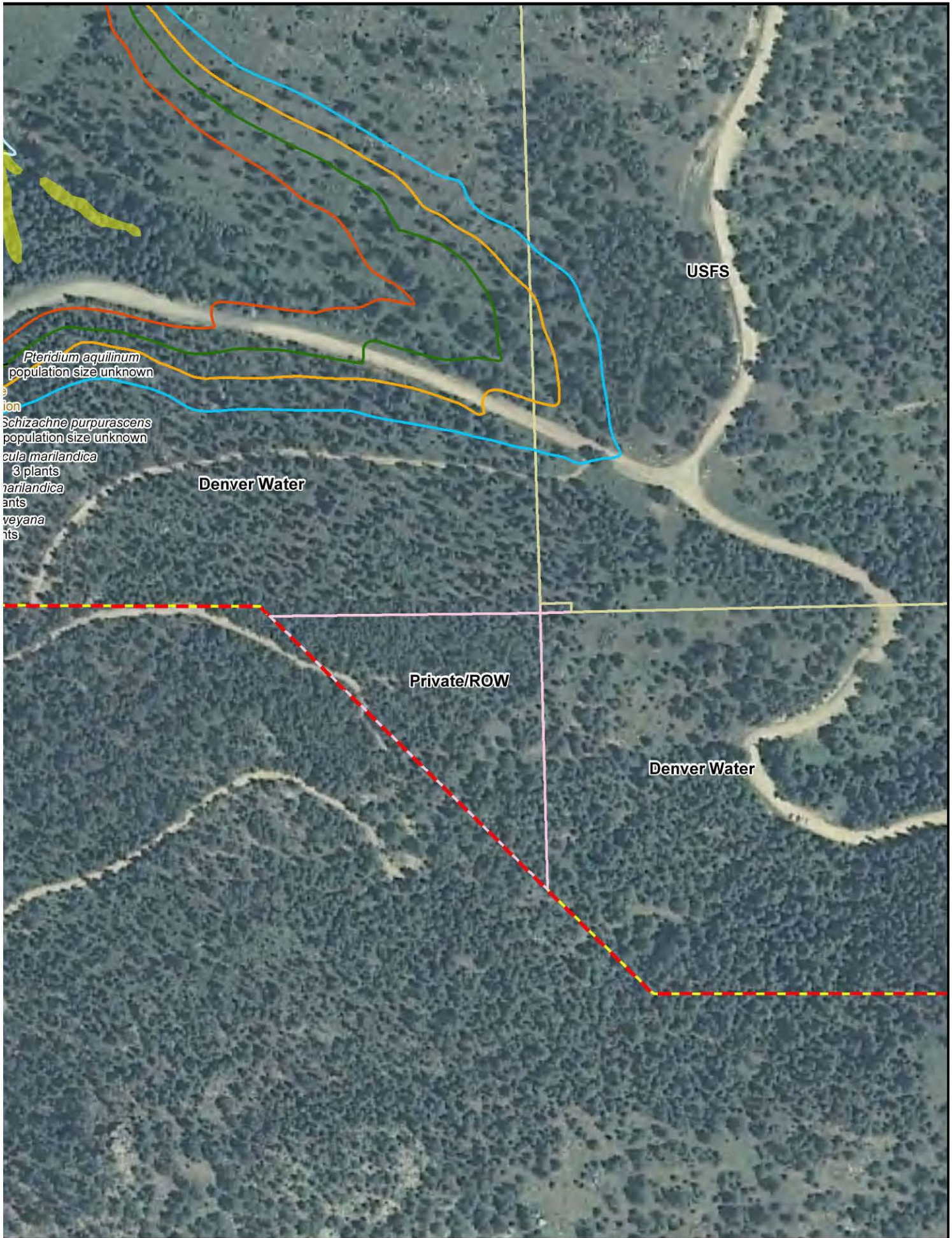












USFS

Pteridium aquilinum
population size unknown

Schizachne purpurascens
population size unknown

Scilla marilandica

3 plants

Scilla marilandica

plants

Scilla marilandica

plants

Denver Water

Private/ROW

Denver Water

Appendix B
Plant Species Observed Within the Gross Reservoir Study Area

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
<i>Aconitum columbianum</i>	Columbian monkshood	Native	Perennial forb
<i>Acer glabrum</i>	Rocky Mountain maple	Native	Tree/shrub
<i>Achillea millefolium</i> var. <i>occidentalis</i>	Western yarrow	Native	Perennial forb
<i>Actaea rubra</i>	Red Baneberry	Native	Perennial forb
<i>Agrostis gigantea</i>	Redtop	Introduced	Perennial graminoid
<i>Agrostis stolonifera</i>	Creeping bentgrass	Introduced	Perennial graminoid
<i>Allium cernuum</i>	Nodding onion	Native	Perennial forb
<i>Alnus incana</i> ssp. <i>tenuifolia</i>	Thinleaf alder	Native	Shrub
<i>Alyssum alyssoides</i>	Yellow allysum	Introduced	Annual forb
<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	Native	Shrub
<i>Angelica ampla</i>	Giant angelica	Native	Perennial forb
<i>Antennaria rosea</i>	Rosy pussytoes	Native	Perennial forb
<i>Apocynum androsaemifolium</i>	Spreadpng dogbane	Native	Perennial forb
<i>Apocynum cannabinum</i>	Indian hemp	Native	Perennial forb
<i>Aralia nudicaulis</i>	Wild sarsaparilla	Native	Perennial forb
<i>Arnica cordifolia</i>	Heartleaf arnica	Native	Perennial forb
<i>Artemisia frigida</i>	Fringed sage	Native	Subshrub
<i>Artemisia campestris</i>	Field sagewort	Native	Biennial/ perennial forb
<i>Artemisia ludoviciana</i>	White sagebrush	Native	Perennial forb
<i>Asplenium septentrionale</i>	Forked spleenwort	Native	Perennial forb
<i>Betula occidentalis</i>	Water birch	Native	Shrub
<i>Bouteloua gracilis</i>	Blue grama	Native	Perennial graminoid
<i>Brickellia grandiflora</i>	Tasselflower bricklebrush	Native	Perennial subshrub/forb
<i>Bromus ciliatus</i>	Fringed brome	Native	Perennial graminoid
<i>Bromus porteri</i>	Porter's brome	Native	Perennial graminoid
<i>Bromus tectorum</i>	Cheatgrass	Introduced	Annual graminoid
<i>Calamagrostis canadensis</i>	Bluejoint reedgrass	Native	Perennial graminoid

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
<i>Caltha leptosepala</i>	Marsh marigold	Native	perennial forb
<i>Calypso bulbosa</i>	Calypso orchid, fairy slipper	Native	Perennial forb
<i>Campanula rotundifolia</i>	Bluebell bellflower	Native	Perennial forb
<i>Carduus nutans</i>	Musk thistle	Introduced	Biennial/perennial forb
<i>Carex aquatilis</i>	Water sedge	Native	Perennial graminoid
<i>Carex deweyana</i>	Dewey sedge	Native	Perennial graminoid
<i>Carex filifolia</i>	Threadleaf sedge	Native	Perennial graminoid
<i>Carex nebrascensis</i>	Nebraska sedge	Native	Perennial graminoid
<i>Carex occidentalis</i>	Western sedge	Native	Perennial graminoid
<i>Carex pellita</i>	Woolly sedge	Native	Perennial graminoid
<i>Carex sprengelii</i>	Sprengel sedge	Native	Perennial graminoid
<i>Ceanothus fendleri</i>	Buckbrush, Fendler's ceanothus	Native	Shrub
<i>Chamerion angustifolium</i> (<i>C. danielsii</i>)	Fireweed	Native	Perennial forb
<i>Circaea alpina</i>	Enchantress's nightshade	Native	Perennial forb
<i>Cirsium arvense</i>	Canada thistle	Introduced	Perennial forb
<i>Cirsium centaure</i>	Fringed thistle	Native	Perennial forb
<i>Cirsium undulatum</i>	Wavyleaf thistle	Native	Perennial forb
<i>Clematis columbiana</i>	Rock clematis	Native	Vine
<i>Clematis ligusticifolia</i>	Western virgin's-bower	Native	vine
<i>Corallorhiza maculata</i>	Summer coralroot	Native	Perennial forb
<i>Cornus sericea</i>	Redosier dogwood	Native	Shrub
<i>Cryptantha (Oreocarya) virgata</i>	Miner's candle	Native	Biennial/perennial forb
<i>Cynoglossum officinale</i>	Hound's tongue	Introduced	Biennial forb
<i>Cyperus erythrorhizos</i>	Redroot flatsedge	Native	Perennial graminoid
<i>Cystopteris fragilis</i>	Brittle bladderfern	Native	Perennial forb

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
<i>Dactylis glomerata</i>	Orchardgrass	Introduced	Perennial graminoid
<i>Descurainia sp</i>	California tansy-mustard	Native	Annual/biennial forb
<i>Dodecatheon pulchellum</i>	Shooting star	Native	Perennial forb
<i>Dryopteris filix-mas</i>	Male fern	Native	Perennial forb
<i>Eleocharis palustris</i>	Common spikerush	Native	Perennial graminoid
<i>Elymus canadensis</i>	Canada wildrye	Native	Perennial graminoid
<i>Elymus elymoides</i>	Bottlebrush squirreltail	Native	Perennial graminoid
<i>Elymus glaucus</i>	Blue wildrye	Native	Perennial graminoid
<i>Elymus trachycaulus</i>	Slender wheatgrass	Native	perennial graminoid
<i>Epilobium ciliatum</i>	Fringed willowherb	Native	Pperennial forb
<i>Equisetum arvense</i>	Field horsetail	Native	Perennial forb
<i>Equisetum laevigatum</i>	Smooth horsetail	Native	Perennial forb
<i>Equisetum variagatum</i> (<i>Hippochaete yariegate</i>)	Smooth scouring rush	Native	Perennial forb
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Native	Shrub
<i>Erigeron speciosus</i>	Aspen fleabane	Native	Perennial forb
<i>Eriogonum (Pterogonum) alatum</i>	Winged buckwheat	Native	Perennial forb
<i>Eriogonum flavum</i>	Yellow buckwheat	Native	Perennial forb
<i>Eriogonum umbellatum</i>	Sulphur buckwheat	Native	perennial forb
<i>Erodium cicutarium</i>	Redstem filaree	Introduced	Annual forb
<i>Euphorbia esula</i>	Leafy spurge	Introduced	Perennial forb
<i>Frageria vesca</i>	Woodland strawberry	Native	Perennial forb
<i>Gaillardia aristida</i>	Common blanketflower	Native	Perennial forb
<i>Galium aparine</i>	Stickywilly	Native	Annual forb
<i>Galium septentrionale</i>	Northern bedstraw	Native	Perennial forb
<i>Geranium caespitosum</i>	Pineywoods geranium	Native	Perennial forb
<i>Geranium richardsonii</i>	Richardson's geranium	Native	Perennial forb

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
<i>Geranium viscosissimum</i>	Sticky purple geranium	Native	Perennial forb
<i>Geum macrophyllum</i>	Largeleaf avens	Native	Perennial forb
<i>Glyceria striata</i>	Fowl mannagrass	Native	Perennial graminoid
<i>Grindelia squarrosa</i>	Curlycup gumweed	Native	Biennial/perennial forb
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Native	Shrub
<i>Heracleum maximum</i>	Common cow parsnip	Native	Perennial forb
<i>Heterotheca villosa</i>	Hairy false goldenaster	Native	Perennial forb
<i>Heuchera bracteata</i>	Bracted alumroot	Native	Perennial forb
<i>Heuchera parviflora</i>	Littleflower alumroot	Native	Perennial forb
<i>Hieracium (Chlorocrepis) sp.</i>	Hawkweed	Native	Perennial forb
<i>Hydrophyllum fendleri</i>	Fendler's waterleaf	Native	Perennial forb
<i>Ipomopsis aggregata</i>	Scarlet gilia	Native	Biennial/perennial forb
<i>Jamesia americana</i>	Cliffbush	Native	Shrub
<i>Juncus effusus</i>	Common rush	Native	Perennial graminoid
<i>Juncus bufonius</i>	Toad rush	Native	Annual graminoid
<i>Juniperus communis</i>	Common juniper	Native	Shrub
<i>Juniperus scopulorum</i>	Rocky Mountain juniper	Native	Tree
<i>Koeleria macrantha</i>	Prairie junegrass	Native	Perennial grass
<i>Lactuca biennis</i>	Tall blue lettuce	Native	Annual/biennial forb
<i>Lactuca pulchella</i>	Blue lettuce	Native	Biennial/perennial forb
<i>Leucanthemum vulgare</i>	Oxeye daisy	Introduced	Perennial forb
<i>Leymus ambiguus</i>	Colorado wildrye	Native	Perennial graminoid
<i>Liatris punctata</i>	Dotted blazing star	Native	Perennial forb
<i>Ligusticum porteri</i>	Lovage	Native	Perennial forb
<i>Linaria dalmatica</i>	Dalmatian toadflax	Introduced	Perennial forb
<i>Lonicera (Distegia) involucrata</i>	Twinberry honeysuckle	Native	Shrub
<i>Lupinus argenteus</i>	Silvery lupine	Native	Perennial forb

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
<i>Luzula parviflora</i>	Smallflowered woodrush	Native	Perennial graminoid
<i>Mahonia repens</i>	Creeping barberry	Native	Shrub
<i>Maianthemum stellatum</i>	Solomon's seal	Native	Perennial forb
<i>Mentha arvensis</i>	Field mint	Native	Perennial forb
<i>Melilotus officinalis</i>	Yellow sweetclover	Introduced	Annual/biennial forb
<i>Mertensia ciliata</i>	Tall fringed bluebells	Native	Perennial forb
<i>Mertensia lanceolata</i>	Prairie bluebells	Native	Perennial forb
<i>Monarda fistulosa</i>	Wild bergamot	Native	Perennial forb
<i>Muhlenbergia montana</i>	Mountain muhly	Native	Perennial graminoid
<i>Oenothera villosa</i>	Hairy evening primrose	Native	Biennial forb
<i>Opuntia macrorhiza</i>	Twinspine pricklypear	Native	Shrub
<i>Penstemon virens</i>	Front Range beardtongue	Native	Perennial forb
<i>Phacelia heterophylla</i>	Scorpion weed	Native	Biennial/perennial forb
<i>Phalaris arundinacea</i>	Reed canarygrass	Native	Perennial graminoid
<i>Phleum pratense</i>	Timothy	Introduced	Perennial graminoid
<i>Physocarpus monogyrus</i>	Mountain Ninebark	Native	Shrub
<i>Physocarpus opulifolius</i>	Common ninebark	Native	Shrub
<i>Picea engelmannii</i>	Engelmann spruce	Native	Tree
<i>Picea pungens</i>	Blue spruce	Native	Tree
<i>Pinus contorta</i>	Lodgepole pine	Native	Tree
<i>Pinus ponderosa</i>	Ponderosa pine	Native	Tree
<i>Piptatherum micranthum</i>	Littleseed ricegrass	Native	Perennial graminoid
<i>Platanthera sp.</i>	Bog orchid	Native	Perennial forb
<i>Poa compressa</i>	Canada bluegrass	Introduced	Perennial graminoid
<i>Poa pratensis</i>	Kentucky bluegrass	Native/introduced	Perennial graminoid
<i>Poa wheeleri</i>	Wheeler's bluegrass	Native	Perennial

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
			graminoid
<i>Polypodium saximontanum</i>	Rocky Mountain polypody	Native	Perennial forb
<i>Populus angustifolia</i>	Narrowleaf cottonwood	Native	Tree
<i>Populus deltoides</i>	Plains cottonwood	Native	Tree
<i>Potentilla (Drymocallis) fissa</i>	Bigflower cinquefoil	Native	Perennial forb
<i>Prosartes trachycarpa</i>	Bellwort	Native	Perennial forb
<i>Prunella vulgaris</i>	Common selfheal	Native	Perennial forb
<i>Prunus americana</i>	Wild plum	Native	Shrub
<i>Prunus pensylvanica</i>	Pin cherry	Native	Tree/shrub
<i>Prunus virginiana</i>	Chokecherry	Native	Shrub
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Native	Perennial graminoid
<i>Pseudotsuga menziesii</i>	Douglas-fir	Native	Tree
<i>Psuedocymopterus montanus</i>	Mountain parsley	Native	Perennial forb
<i>Pteridium aquilinum</i>	Bracken fern	Native	Perennial forb
<i>Pterospora andromedea</i>	Pinedrops	Native	Perennial forb
<i>Pulsatilla patens (P. ludoviciana)</i>	Pasque flower	Native	Perennial forb
<i>Purshia tridentata</i>	Antelope bitterbrush	Native	Shrub
<i>Rhus trilobata</i>	Skunkbush sumac	Native	Shrub
<i>Ribes cereum</i>	Wax currant	Native	Shrub
<i>Ribes inerme</i>	Whitestem gooseberry	Native	Shrub
<i>Rosa woodsii</i>	Wood's rose	Native	Shrub
<i>Rubus deliciosus</i>	Boulder raspberry	Native	Shrub
<i>Rubus idaeus</i>	Wild raspberry	Native	Shrub
<i>Rudbeckia laciniata</i>	Cutleaf coneflower	Native	Perennial forb
<i>Salix eriocephala</i>	Missouri River willow	Native	Shrub
<i>Salix exigua</i>	Sandbar willow	Native	Shrub
<i>Salix exigua</i>	Sandbar willow	Native	Shrub
<i>Salix monticola</i>	Park willow	Native	Shrub
<i>Sanicula marilandica</i>	Maryland sanicle	Native	Perennial forb
<i>Schizachne purpurascens</i>	False melic	Native	Perennial

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)
Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
			graminoid
<i>Scirpus microcarpus</i>	Panicked bulrush	Native	Perennial graminoid
<i>Sedum lanceolatum</i>	Spearleaf stonecrop	Native	Perennial forb
<i>Selaginella densa</i>	Lesser spikemoss	Native	Perennial forb
<i>Selaginella mutica</i>	Bluntleaf spikemoss	Native	Perennial forb
<i>Selaginella underwoodi</i>	Underwood's spikemoss	Native	Perennial forb
<i>Senecio triangularis</i>	Arrowleaf ragwort	Native	Perennial forb
<i>Shepherdia canadensis</i>	Russet buffaloberry	Native	Shrub
<i>Sisymbrium altissimum</i>	Tumble mustard	Introduced	Annual forb
<i>Solidago canadensis</i>	Canada goldenrod	Native	Perennial forb
<i>Solidago missouriensis</i>	Missouri goldenrod	Native	Perennial forb
<i>Solidago multiradiata</i>	Rocky Mountain goldenrod	Native	Perennial forb
<i>Streptopus amplexifolius</i> (<i>S. fassettii</i>)	Clasp-leaf twisted stalk	Native	Perennial forb
<i>Cornus</i> (<i>Swida</i>) <i>sericea</i>	Redosier dogwood	Native	Shrub
<i>Symphoricarpos albus</i>	Common snowberry	Native	Shrub
<i>Symphoricarpos rotundifolius</i>	Roundleaf snowberry	Native	Shrub
<i>Thalictrum fendleri</i>	Fendler's meadowrue	Native	Perennial forb
<i>Thalictrum occidentale</i>	Western meadow rue	Native	Perennial forb
<i>Thermopsis montana</i>	Mountain goldenbanner	Native	Perennial form
<i>Thinopyrum intermedium</i>	Intermediate wheatgrass	Introduced	Perennial graminoid
<i>Toxicodendron rydbergii</i>	Western poison ivy	Native	Shrub/vine
<i>Tradescantia occidentalis</i>	Spiderwort	Native	Perennial forb
<i>Tragopogon dubius</i>	Yellow salsify	Introduced	Annual/biennial forb
<i>Urtica dioica</i>	Stinging nettle	Native/introduced	Perennial forb
<i>Vaccinium myrtillus</i>	Whortleberry	Native	Shrub
<i>Verbascum thapsus</i>	Common mullein	Introduced	Biennial forb
<i>Verbena stricta</i>	Hoary verbena	Native	Annual/perennial forb
<i>Veronica americana</i>	American speedwell	Native	Perennial forb
<i>Veronica anagallis-aquatica</i> (<i>V.</i>	Water speedwell	Native	Biennial/perennial

Appendix B

Plant Species Observed Within the Gross Reservoir Study Area

Table B1 (cont.)

Plant Species Observed in the Gross Reservoir Study Area

Scientific Name*	Common Name	Origin	Life Form
<i>catenata</i>)			forb
<i>Viburnum edule</i>	Squashberry	Native	Shrub
<i>Viola canadensis</i>	Canada violet	Native	Perennial forb
<i>Vitis riparia</i>	Riverbank grape	Native	Vine
<i>Yucca glauca</i>	Soapweed yucca	Native	Shrub

Names follow Plants Database (NRCS 2011). Synonyms in Weber and Wittman (2003) are in parentheses.

Appendix C

Photographs



Photograph 1. *Aralia nudicaulis* showing fruits. Photograph taken along South Boulder Creek (Appendix A, Map 6), July 23, 2010.



Photograph 2. *Aralia nudicaulis* habitat. Photograph taken within Forsythe Canyon (Appendix A, Map 2), July 21, 2010.



Photograph 3. *Carex deweyana*. Photograph taken in Forsythe Canyon (Appendix A, Map 2), August 17, 2010.



Photograph 4. *Carex deweyana* inflorescence. Photograph taken in Forsythe Canyon (Appendix A, Map 2), August 17, 2010.



Photograph 5. *Carex deweyana* habitat. Photograph taken in Winiger Gulch (Appendix A, Map 4), August 4, 2010.



Photograph 6. *Carex sprengelii* inflorescence. Photograph taken in Winiger Gulch (Appendix A, Map 4), August 4, 2010.



Photograph 7. *Carex sprengelii* habitat Photograph taken in Winiger Gulch (Appendix A, Map 4), August 4, 2010.



Photograph 8. *Circaea alpina* with fruits. Photograph taken in Winiger Gulch (Appendix A, Map 2), August 18, 2010.



Photograph 9. *Circaea alpina* habitat. Photograph taken in West Tributary (Appendix A, Map 7), July 24, 2010.



Photograph 10. *Lactuca biennis*. Photograph taken in Winiger Gulch (Appendix A, Map 5), August 4, 2010.



Photograph 11. *Lactuca biennis* habitat. Photograph taken in Winiger Gulch (Appendix A, Map 5), August 4, 2010.



Photograph 12. *Sanicula marilandica* with fruits. Photograph taken in East Tributary (Appendix A, Map 7), August 18, 2010.



Photograph 13. *Sanicula marilandica* habitat. Photograph taken in East Tributary (Appendix A, Map 7), August 18, 2010.



Photograph 14. Area disturbed by fire. Note perennial creek and associated riparian area. Photograph taken July 21, 2010.



Photograph 15. Disturbed picnic area. Photograph taken July 21, 2010.



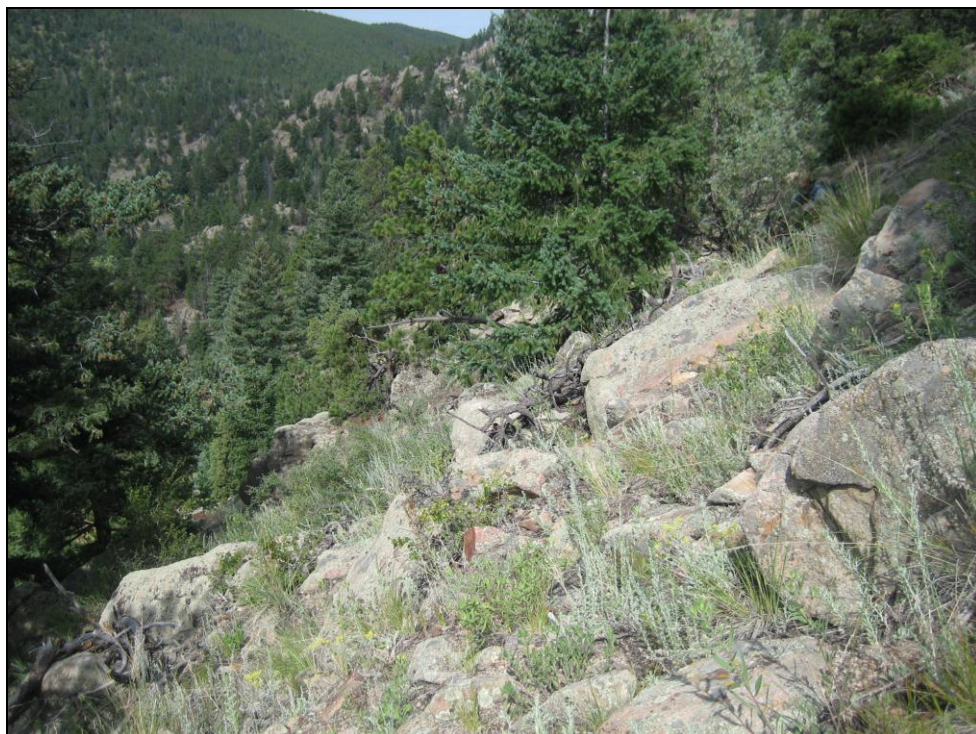
Photograph 16. Blue spruce within Forsythe Canyon (Appendix A, Map 4).
Photograph taken July 21, 2010.



Photograph 17. Mid-seral aspen community. Photograph taken July 20, 2010.



Photograph 18. Rock outcrop community. Photograph taken July 23, 2010.



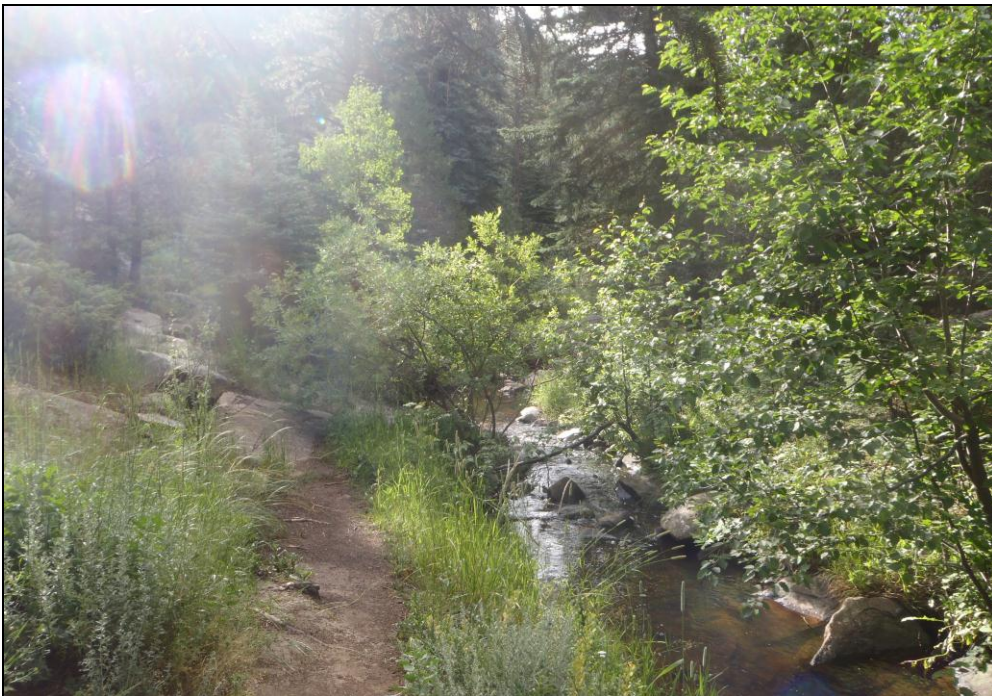
Photograph 19. Mixed conifer community. Photograph taken July 21, 2010.



Photograph 20. Open Ponderosa pine community. Photograph taken July 27, 2010.



Photograph 21. Riparian area community (Appendix A, Map 2). Photograph taken July 21, 2010.



Photograph 22. Foothills riparian shrub and thinleaf alder mesic forb riparian shrubland community within Forsythe Canyon (Appendix A, Map 1 and 2). Photograph taken July 21, 2010.

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Attachment D
Rare Plant Survey for Gross Reservoir, Arapaho National Forest,
Boulder County, Colorado

**RARE PLANT SURVEY FOR GROSS
RESERVOIR, ARAPAHO NATIONAL FOREST
BOULDER COUNTY, COLORADO**

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URS

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Appendices

Appendix A - Photographs

Tables

Table 1 – List of TRPS With the Potential to Occur Within Gross Reservoir

Table 2 – Locations of Observed TRPS

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Introduction

A field survey for the Targeted Rare Plant Species (TRPS) was completed around the shore edge of Gross Reservoir. In addition, the inlets to Gross Reservoir were also surveyed. These inlet canyons are cool and darker than the surrounding areas and could harbor some of these rare plants.

Documentation of the locations of the TRPS at these particular site locations was conducted so that future site work of the Gross Reservoir expansion will avoid any TRPS or Endangered Species listed under the Endangered Species Act, proposed for federal listing, or designated as sensitive in Region 2 of the Arapaho National Forest.

All species included in the survey are listed in Table 1. Locations of observed TRPS are included in Table 2. Photographs of observed TRPS are included in Appendix A.

Objectives

Results of the Rare Plant survey will facilitate avoidance of these rare plants during the next phase of the Gross Reservoir expansion. The main objectives of the rare survey were to document the locations of any Rare Plant Species in the Site Locations.

Methods

Pre-field Review

Pre-field review work included analysis of potential rare plant species that could or do occur on the Arapaho National Forest and a review of Colorado Natural Heritage Program records along with herbarium records from the University of Colorado. Current available maps of the area were also reviewed. Verbal direction from the United States Forest Service Botanist for the Arapaho/ Roosevelt/Pawnee National Forests and Grasslands was incorporated into the study design.

Field Reconnaissance

The study area was determined by URS and Scott F Smith, rare plant specialist. Field surveys preformed between July 1st and July 15th 2010. The study area was walked to identify the locations of potential habitats of TRPS. The starting point was the parking lot at the North Shore of Gross Reservoir. The surveys proceeded westward to Forsythe Canyon and Forsythe Creek. The eastern edge of the reservoir (including the North Shore parking area) was also surveyed. The South Shore area was surveyed from the South Shore Parking lot westward up into the Boulder Creek Canyon inlet. All of the inlets and cool canyons along the western edge were surveyed from the Western accesses.

Recording the locations of the TRPS at these particular site locations was conducted using a handheld Global Positioning System unit. Photographs of TRPS were taken, as were representative photographs of the study area. No GPS points were taken for any of the Fern Allies. Fern Allies are not considered part of the “All Fern Species excepting *Cystopteris fragilis*”, in this survey.

Results

For the majority of the plants not found on this species list it was due to either the habitats not being correct or the elevations being too low in altitude. Many of the species not found require wet marshy habitats that do not occur in the Gross Reservoir Study area. In addition several of these species are not known to exist in Colorado at this time.

The Gross Reservoir Study area for the majority is a Ponderosa Pine community. The Ponderosa Pine community is typically too dry for many of these plants from the TRPS list. The table following details possible reason why these plants were not found. In addition even if the habitats are correct, these plants don’t always grow there. This is indeed why they are rare.

The Gross Reservoir Study area has a typical Pikes Peak Granite substrate. This limits the occurrence of some of the TRPS being found in the area.

Table 1 lists all TRPS to be surveyed for within Gross Reservoir. Table 2 includes the GPS location of observed TRPS.

Table 1
List of Targeted Rare Plant Species (TRPS) With the Potential to Occur
Within Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence	Observed?
Rocky Mountain columbine	<i>Aquilegia saxamontana</i>	<i>Elevation really too low for this</i>	No
Park milkvetch	<i>Astragalus leptaleus</i>	<i>Habitat not correct for this</i>	No
Upswept moonwort	<i>Botrychium ascendens</i>	<i>Habitat not correct for this</i>	No
Iowa moonwort	<i>Botrychium campestre</i>	<i>Habitat not correct for this</i>	No
Fork-leaved moonwort	<i>Botrychium "furcatum"</i>	<i>Habitat not correct for this</i>	No
Triangle-leaved moonwort, green-stemmed phase	<i>Botrychium lanceolatum (green stem genotype)</i>	<i>Habitat not correct for this</i>	No
Slender moonwort	<i>Botrychium lineare</i>	<i>Habitat not correct for this</i>	No
Leather leaf grapefern	<i>Botrychium multifidum</i>	<i>Habitat not correct for this</i>	No
Paradox moonwort	<i>Botrychium paradoxum</i>	<i>Habitat not correct for this</i>	No
Northwestern moonwort	<i>Botrychium pinnatum</i>	<i>Habitat not correct for this</i>	No
"Redbank" moonwort	<i>Botrychium "redbank"</i>	<i>Habitat not correct for this</i>	No
Least moonwort	<i>Botrychium simplex</i>	<i>Habitat not correct for this</i>	No
Spatulate moonwort	<i>Botrychium spathulatum</i>	<i>Habitat not correct for this</i>	No
Lesser panicled sedge	<i>Carex diandra</i>	<i>Habitat not correct for this</i>	No
Clustered lady's slipper	<i>Cypripedium fasciculatum</i>	<i>Habitat not correct for this</i>	No
Greater yellow lady's slipper	<i>Cypripedium parviflorum var. pubescens</i>	<i>None Found</i>	No
Mountain bladderfern	<i>Cystopteris montanum</i>	<i>Elevation to low</i>	No

Table 1
List of Targeted Rare Plant Species (TRPS) With the Potential to Occur
Within Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence	Observed?
Clawless draba	<i>Draba exungiculata</i>	<i>Elevation to low</i>	<i>No</i>
Austrian draba	<i>Draba fladnizensis</i>	<i>Elevation to low</i>	<i>No</i>
Gray's draba	<i>Draba grayana</i>	<i>Elevation to low</i>	<i>No</i>
Porsild's draba	<i>Draba porsildii</i>	<i>Elevation to low</i>	<i>No</i>
Hall's fescue	<i>Festuca hallii</i>	<i>Habitat not correct for this</i>	<i>No</i>
Rattlesnake-plantain	<i>Goodyera repens</i>	<i>None found</i>	<i>No</i>
Northern twayblade	<i>Listera borealis</i>	<i>Habitat not correct for this</i>	<i>No</i>
Broadlipped twayblade	<i>Listera convallariodes</i>	<i>Habitat not correct for this</i>	<i>No</i>
Heartleaved twayblade	<i>Listera cordata</i>	<i>Habitat not correct for this</i>	<i>No</i>
Marsh felwort	<i>Lomatogonium rotatum</i>	<i>Habitat not correct for this</i>	<i>No</i>
Stiff club-moss	<i>Lycopodium annotinum</i>	<i>Habitat not correct for this</i>	<i>No</i>
Groundcedar	<i>Lycopodium complanatum</i> (<i>Diphasiastrum complanatum</i>)	<i>Not known from Colorado</i>	<i>No</i>
Colorado tansy-aster	<i>Machaeranthera coloradoensis</i>	<i>Elevation to low</i>	<i>No</i>
Kotzebue's grass of Parnassus	<i>Parnassia kotzebuei</i>	<i>Habitat not correct for this, Elevation to low</i>	<i>No</i>
Budding monkeyflower	<i>Mimulus gemniparus</i>	<i>None found</i>	<i>No</i>
Sweet coltsfoot	<i>Petasiles sagittatus</i>	<i>Habitat not correct for this</i>	<i>No</i>
Rocky Mountain cinquefoil	<i>Potentilla rupicola</i>	<i>None found</i>	<i>No</i>
Ice cold buttercup	<i>Ranunculus karelinii</i>	<i>Habitat not correct for this</i>	<i>No</i>
Pictureleaf wintergreen	<i>Pryola picta</i>	<i>None found</i>	<i>No</i>
Dwarf raspberry	<i>Rubis arcticus ssp acaulis</i>	<i>None found, Habitat marginal</i>	<i>No</i>
Silver willow	<i>Salix serrissima</i>	<i>Habitat not correct for this</i>	<i>No</i>
Club spikemoss	<i>Selaginella selaginoides</i>	<i>Not known in Colorado</i>	<i>No</i>

Table 1
List of Targeted Rare Plant Species (TRPS) With the Potential to Occur
Within Gross Reservoir

Common Name	Scientific Name	Potential for Occurrence	Observed?
Sphagnum	<i>Sphagnum angustifolium</i>	<i>Habitat not correct for this</i>	No
Baltic bog moss	<i>Sphagnum balticum</i>	<i>Habitat not correct for this</i>	No
Alpine meadowrue	<i>Thalictrum alpinum</i>	<i>Habitat not correct for this</i>	No
Lesser bladderwort	<i>Utricularia minor</i>	<i>Habitat not correct for this</i>	No
Selkirk's violet	<i>Viola selkirkii</i>	<i>None found</i>	No
Ferns, all except <i>Cystopteris fragilis</i>			Yes
	<i>Asplenium septentrionales</i>	High	Yes
	<i>Asplenium trichomanes</i> <i>ssp. trichomanes</i>	High	No
	<i>Athyrium filix-femina</i>	High	No
	<i>Dryopteris filix-mas</i>	High	Yes
	<i>Polypodium saximontana</i>	High	Yes
	<i>Pteridium aquilinum</i>	High	Yes
	<i>Woodsia oregana</i>	High	Yes
	<i>Woodsia scopulina</i>	High	Yes

Table 2
Locations of Observed TRPS

Species Scientific Name	Location	Datum	Easting	Northing	Elevation (feet)
<i>Asplenium septentrionalis</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0469284	4422798	7,446
<i>Dryopteris felix-mas</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0468766	4421398	7,399
<i>Polypodium saximontana</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0467470	4422962	7,347
<i>Pteridium aquilinum</i> ssp. <i>pubescens</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0467476	4423054	7,344
<i>Pteridium aquilinum</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0468766	4421398	7,399
<i>Woodsia oregana</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0469594	4422533	7,364
<i>Woodsia oregana</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0467470	4422962	7,347
<i>Woodsia oregana</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0468881	4421729	7,347
<i>Woodsia oregana</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0466832	4420837	7,320
<i>Woodsia scopulina</i>	Arapaho National Forest, Gross Reservoir Boulder County, Colorado	NAD 83 13S	0466832	4420837	7,320

NAD = North American Datum

S = South

Species observed within the study area are discussed below by area of occurrence.

North Shore

All TRPS list plants were found in typical growing habitat where you would find these across Colorado. No special micro habitats were found.

A small drainage below and just east of the North Shore parking lots contains several examples of *Woodsia oregana* ssp. *cathcartiana* fern. The edges along the shore here at the picnic grounds have several scattered populations of *Equisetum laevigatum*, a fern ally. Both of these species are common across Colorado.

From the pedestrian trail just above the shore line along the north shore upwards (or ascending side), towards the boulders and rocky cliffs, scattered populations of the cactus types, *Pediocactus simpsonii*, *Opuntia macrorhiza*, and *Opuntia polyacantha* occur. All three are common cactus in Colorado. *P. simpsonii* is usually much harder to see, due to its small size and nature. Mixed in with the dry land scrub and cactus there are many populations of two *Physaria* species. Both *Physaria montana* (*Lesquerella montana*) and *Physaria vitulifera* can be found in small scattered occurrences. Both are common *Physaria* species in Colorado even though *Physaria vitulifera* is a Colorado endemic.

In the cliffs and rocky habitat above the trail leading back to Forsythe Canyon there are populations of *Cystopteris fragilis* fern and *Woodsia oregana* ssp. *cathcartiana* fern. Both of these ferns are common in Colorado, especially *Cystopteris fragilis*. *Asplenium septentrionale* ferns were also found in small quantities in the cracks in the rocks and boulders. This fern is uncommon but not rare and can be found throughout the Front Range. This species is usually overlooked as it resembles grass (as the common name of this fern indicates, this species is also known as the “Grass Fern”). It remains uncommon because it is not usually recognized as a fern.

The orchid *Corallorhiza maculata* occasionally occurs in the small drainages filled with Ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) trees. This is the most common of the four coralroot orchids of Colorado. In these drainages, there are many occurrences of the saprophytic plant *Pterospora andromedea*, or pine drops. It seems to be a banner year for these plants. They live off of the rotting pine duff and are usually found close to the *Corallorhiza maculata* orchids. In the cracks of boulders and larger rocks *Selaginella densa* and *Selaginella underwoodii* fern allies exist in some abundance, with *S. densa* observed more commonly. Both *Selaginella* species are common in Colorado.

The area around the inlet of Forsythe Creek into Gross Reservoir becomes much wetter habitat. Dark, cool conditions exist as the canyon starts its ascent upwards towards its source. A large population of bracken fern or *Pteridium aquilinum* ssp. *pubescens* occurs in the area between Gross Reservoir and Forsythe Falls. This population is spread out over several acres. Closer to water sources within this same area is the bog orchid *Platanthera huronensis*. It is a small population of less than 50 plants. This orchid is common across Colorado.

The uncommon fern *Polypodium saximontana* occurs on the north facing slopes of the cliff faces above Forsythe Creek. *Polypodium saximontana* is relatively common across its range in Colorado, but may be less common in the Arapaho National Forest. On the same cliffs are found *Woodsia oregana* ssp. *cathcartiana* and *Cystopteris fragilis*. Many hundreds of plants of the TRPS *Aralia nudicaulis* also occur in the drainage.

Several orchids, including *Platanthera huronensis* and *Calypso bulbosa* along with *Corallorhiza maculata* occur in the dark, cooler portion of the Forsythe Creek drainage from the western end of the property down to Gross Reservoir. Along the creek bottom, *Cystopteris fragilis*, *Equisetum arvense*, *Equisetum hyemale*, *Equisetum laevigatum*, and *Pteridium aquilinum* ssp. *pubescens* were found. None are rare.

South and West Shores

Starting from the South Shore parking lot and walking westward along the pedestrian trail, the following ferns can be found in the rocks and boulders:

- *Cystopteris fragilis*
- *Woodsia oregana* ssp. *cathcartiana*
- *Selaginella densa*
- *Selaginella mutica*
- *Selaginella underwoodii*

All five of these species are common in Colorado. In the two small unnamed drainages coming down into Gross Reservoir on the South and West Shore, *Platanthera huronensis* orchids grow close to the reservoir edge. Starting from the reservoir edge within the drainages, the ferns *Cystopteris fragilis*, *Dryopteris filix-mas*, and *Pteridium aquilinum* ssp. *pubescens* were observed. *Dryopteris filix-mas* is an uncommon fern across Colorado, but not rare. When it is found there are usually quite a few. Excepting of course, here at Gross Reservoir. They do exist in other cool weather drainages close to Gross Reservoir and are much more abundant there.

Shortly before the South Shore trail reaches the Boulder Creek Inlet, the fern *Woodsia scopulina* ssp. *scopulina* begins to appear in large numbers. *Woodsia oregana* ssp. *cathcartiana* and *Cystopteris fragilis* can be found growing here also. *Selaginella mutica* and *Selaginella underwoodii* are found growing on the sandstone rocks and boulders in the area. Along the edge of Boulder Creek where it forms a confluence with Gross reservoir *Equisetum arvense*, *Equisetum laevigatum*, and *Equisetum hyemale* grow along the shore edge. The TRPS *Aralia nudicaulis* also occurs in large populations in this area.

All along the South Shore trail are groups of pine drops or *Pterospora andromedea*. These are more prevalent on the south side of the reservoir

versus the north side. Occasional occurrences of *Corallorhiza maculata* were observed growing in the pine duff within the ponderosa pine forests.

A few other ferns were expected to occur within Gross Reservoir but were not observed. They are known to exist on other portions of Denver Water property downstream of Gross Reservoir, so it is a good assumption that they could grow also in the Gross Reservoir area and were just not seen. These ferns that could possibly exist are *Asplenium trichomanes* ssp. *trichomanes* and *Athyrium filix-femina*. These ferns are not rare but uncommon in Colorado.

Conclusion

Of the 6 fern species and 3 orchid species observed, none are rare. Some are considered uncommon as they are rarely seen by most people.

No rare or unique habitats were observed in this survey. Targeted Rare Plant Species were found in the typical habitats that you find these plants in across the state.

The project area contains 6 species of ferns that are on target list.

References Used

Colorado Native Plant Society. 1997. *Rare Plants of Colorado*.

Colorado Natural Heritage Program. 1999. *Conservation Status Handbook Colorado's Animals, Plants, and Plant Communities of Special Concern*.

Colorado Native Plant Society in Cooperation with Rocky Mountain Nature Association. 1989. *Rare Plants of Colorado*. Rocky Mountain Nature Association and Colorado Native Plant Society. Falcon Press.

Flora of North America Editorial Committee, 1993. *Flora of North America, Volume 2, Pteridiophytes and Gymnosperms*. Oxford University Press.

Flora of North America Editorial Committee, 1993. *Flora of North America, Volume 26, Agavaceae, Aloaceae, Burmanniaceae, Dioscoreaceae,*

Orchidaceae, Pontederiaceae, Smilacaceae and Stemonaceae. Oxford University Press.

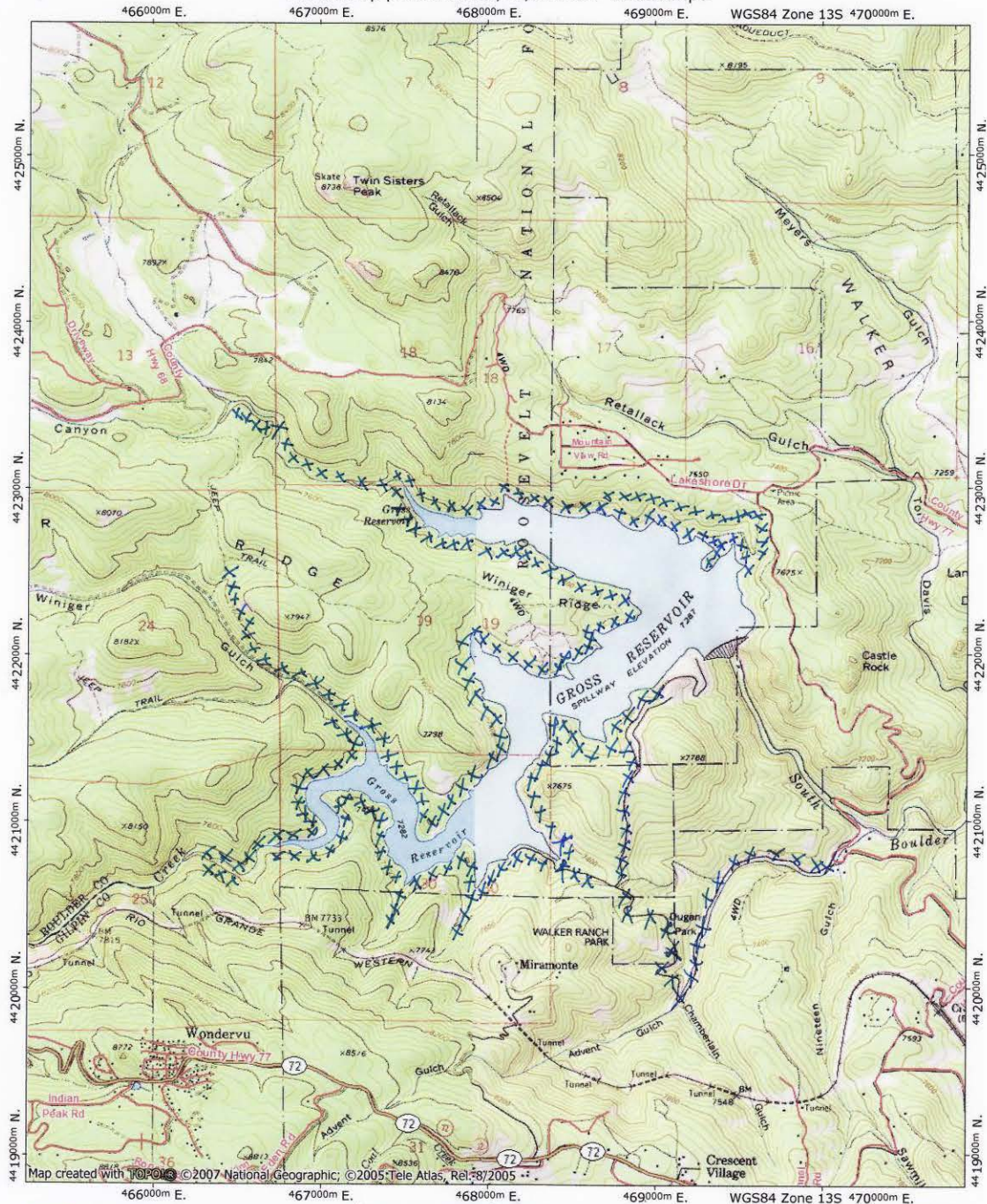
Root, Peter. 1996a. *Colorado Moonwort Guide*.

Root, Peter. 1996b. *Pikes Peak Moonwort Report*.

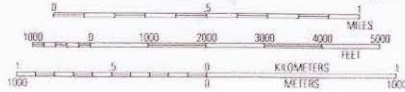
Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. *Colorado Rare Plant Field Guide*. Prepared for the Bureau of Land Management, the U.S. Forest Service, and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.

Weber, W.A., and R. Wittmann. 1990. *Colorado Flora: Eastern Slope*. Colorado Associated University Press, Boulder, Colorado.

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NATIONAL GEOGRAPHIC



TN MN
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X = Areas of Rare Plant Search

Scott F. Smith

Appendix A

Photographs



Gross Reservoir, North Shore looking South/ Southwest.



Gross Reservoir, Boulder Creek Inlet.



Gross Reservoir, looking west /southwest.



Gross Reservoir, looking eastward.



Asplenium septentrionale



Cystopteris fragilis



Dryopteris filix-mas



Equisetum arvense



Equisetum hyemale



Equisetum laevigatum



Pediocactus simpsonii



Platanthera huronensis



Polypodium saximontanum



Pteridium aquilinum* ssp. *pubescens



Selaginella densa



Selaginella mutica



Selaginella underwoodii



Woodsia oregana



Woodsia scopulina

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Appendix G-4
Denver Water Watershed Involvement, Accomplishments,
and Plans for the Future

Denver Water Watershed Involvement, Accomplishments, and Plans for the Future

Following the 1996 Buffalo Creek Fire, the links between poor forest health, wildfire, and subsequent erosion, sedimentation, and water quality degradation highlighted the vulnerability of Denver Water's water collection system. In 1998, Denver Water, the Colorado State Forest Service (CSFS), and the U.S. Forest Service (USFS) partnered to form the Upper South Platte Project. Much of the Upper South Platte Watershed was considered to be high hazard for wildfire. An assessment of 650,000 acres within the Upper South Platte Watershed identified several sub-watersheds that were at high risk for catastrophic fire and the after effects. Before fuel hazard reduction projects were completed, the Schoonover and the Hayman fires burned in 2002, and huge volumes of sediment and debris were subsequently deposited into Cheesman and Strontia Springs reservoirs.

Fortunately the partially-completed forest treatments were effective in protecting the headquarters complex at Cheesman Reservoir from the Hayman fire, even without intervention by fire fighters. Denver Water has spent over \$26 million as of October 2013 on post-fire mitigation efforts in the Upper South Platte Watershed including the dredging of Strontia Springs Reservoir, which began in the spring of 2011.

Denver Water, CSFS, and USFS have treated (e.g., forest thinning and fuel breaks) and reforested nearly 36,000 acres within the Upper South Platte Project area and work continues. The clear lesson from Denver Water's efforts is that the cost to identify and treat these high hazard areas within the watershed is far less than the cost to fight fire and to conduct post-fire recovery actions. According to the Front Range Watershed Assessment by the Pinchot Institute (a conservation organization based in Washington, D.C.), the most significant watershed issue facing major water providers in Colorado is the high risk of catastrophic fire.

To add to the on-going fire hazards, Colorado's forests are experiencing several large-scale insect infestations of mountain pine beetle in lodgepole pine forests, Sudden Aspen Decline Disease, and spruce and western balsam bark beetle outbreaks that are expanding to spruce-fir forests. This decline in forest health caused by decades of fire suppression and lack of active forest management has left unnaturally dense forests that could contribute to future catastrophic fires in any of Denver Water's watersheds.

The successful cooperative effort between Denver Water, CSFS, and USFS is the model used by the larger Front Range Fuels Treatment Partnership and its advisory arm, the Front Range Roundtable. The Front Range Roundtable is a nationally-recognized, widely diverse group of more than 45 agencies, counties, environmental organizations, and other interest groups that support forest health, restoration, and protection of communities from wildfire. The Colorado Bark Beetle Cooperative is the West Slope counterpart to the Front Range Roundtable. The main focus of these two coalitions has been to implement forest treatments to protect life and property.

Another coalition was formed by Colorado water providers, USFS, and CSFS. The Watershed Wildfire Protection Work Group's (Watershed Group's) purpose is to protect critical watersheds by reducing the threat of high-severity wildfires and their potential impacts on water collection, storage, transportation system infrastructure, and watershed function. Denver Water actively participates in all of these groups.

The Watershed Group spent a year developing a watershed assessment methodology to identify specific areas within watersheds that are critical for public water supplies. This watershed assessment and prioritization process has been applied to Denver Water's watersheds. The **Forest-to-Faucet Partnership** (Partnership) that Denver Water and the USFS entered into is based on the results of this watershed assessment. Denver Water entered into a Memorandum of Understanding (MOU) with the USFS to work together to proactively improve the health and resiliency of forests and watersheds in areas critical for providing and delivering water to Denver Water and its customers.

In 2010, Denver Water and the USFS entered into a collection agreement for the first year of a potential 5-year Operating Plan. The goal of the original 5-year Operating Plan was to equally share an investment of \$33 million, over a 5-year period, in restoration projects on more than 38,000 acres of National Forest Lands. The 5-year Operating Plan identifies joint projects in each of Denver Water's priority watersheds. This collection agreement provided Denver Water funds in support of the first set of projects identified in the 5-year Operating Plan with additional funds from the USFS being applied to forest treatments. Denver Water has now entered into its fourth collection agreement and the Partnership is now expected to accomplish forest treatments and reforestation work on over 42,000 acres of National Forest Lands through the 5-year Partnership.

The Partnership is accelerating and expanding the USFS' ability to restore forest health in watersheds critical for Denver Water's water supplies and infrastructure. Forest thinning and other wildfire fuels reduction projects have and will continue to take place around and upstream of Strontia Springs, Dillon, Gross, Antero, Eleven Mile Canyon, and Cheesman reservoirs, and in areas by Winter Park Resort within the Moffat Collection System. These projects will reduce the risk of wildfires upstream of Denver Water's reservoirs and other water delivery infrastructure.

As of October 2013, the Partnership has treated and reforested close to 18,000 acres. As part of the Partnership, the **Forsythe Fuels Reduction Project** (located above Gross Reservoir) went through the National Environmental Policy Act of 1969, as amended, process. The goals of the Forsythe Fuels Reduction Project are to reduce the threat of large-scale wildfire by reducing hazardous fuels, reduce the threat of forest resources from the existing mountain pine beetle epidemic, and continue moving toward desired conditions as described in the Forest Plan for the Arapaho & Roosevelt National Forests and Pawnee National Grasslands.

Forest health treatments will help protect water resources for Denver Water's customers as well as millions of other downstream beneficiaries, including homes, businesses, and agriculture. Restoration also will help the forests become more resistant to future insect

and diseases, reduce wildfire risks, and maintain habitat for fish and wildlife. More resilient forests will also be more adaptive to the impacts of a changing climate.

Denver Water has given thousands of dollars to Winter Park Resort since 2008 to accomplish mutually beneficial forest treatments on hundreds of acres within Denver Water's Moffat Collection System. Denver Water has contracted with CSFS for over 10 years to complete forest health treatments, and restoration on Denver Water lands in Grand, Summit, Boulder, Park, Jefferson, and Douglas counties. There has been over 15,000 acres completed on Denver Water's lands and there are plans for an additional 7,300 acres in the future. Denver Water has spent millions of dollars on accomplishing this work on its lands.

Denver Water was involved in the **Winiger Ridge Ecosystem Management Project** around Gross Reservoir. In 1996, a sub-group of the Boulder County Wildfire Mitigation Group was formed to address the issues of wildfire mitigation, forest health, and watershed protection on a landscape scale. The Boulder County Ecosystem Cooperative chose an area in southern Boulder County to implement such a landscape-scale project. Named for the primary ridge that runs through the project area, the Winiger Ridge Ecosystem Management Project was begun. The partnership involved USFS, CSFS, Boulder County, City of Boulder, Denver Water, Eldorado Canyon State Park, Cherryvale Fire District, and High Country Fire District. Numerous activities have been carried out since the beginning of the Winiger Ridge Ecosystem Management Project that involved forest and stand exams, prescription writing, and implementation of vegetation management. Some of the activities carried out on Denver Water property and within the Federal Energy Regulatory Commission (FERC) boundary include the Winiger Gulch prescribed burn (USFS lands), preparation of the Gross Peninsula prescribed burn (USFS and Denver Water lands), fuel break thinning along Gross Dam Road (Denver Water land), and thinning of dense/overstocked stands (all lands). Currently, Denver Water has a 5-year Forestry Plan that is being implemented on its lands around Gross Reservoir as required by its hydropower license with FERC.

Denver Water is also continuing to investigate the possibility of developing collaborative private landscape-scale forest health treatments in watersheds critical for its water supplies. It is part of Denver Water's Mission Statement to be a good steward of the land. Denver Water realizes how important it is to keep its watersheds healthy.

